STIC Search Report
EIC 3700

Scientific & Technical Information Center
USPTO

STIC Database Tracking Number: 121980

TO: Andrea Ragonese
Location: pk1 11e50
Art Unit: 3743
Monday, May 17, 2004

Case Serial Number: 10/660366

From: Emory Damron
Location: EIC 3700
CP2-2C08
Phone: 305-8587

Emory.Damron@uspto.gov

Search Notes

Dear Andrea,

Please find below an inventor search in the bibliographic and full-text foreign patent files, as well as keyword searches in the patent and non-patent literature files, both bibliographic and full text.
References of potential pertinence have been tagged, but please review all the packets in case you like something I didn't.
In addition to searching on Dialog, I also searched Google.com, EPO/JPO/Derwent, ScienceDirect and Scirus.com.
I searched the major concepts you provided, and focused on the "venous return", the possibility of a wireless communication feature, and the fact that this was a "method" per se; as expected, most of the better art was related to one or all of the inventors in some way, but please review all the material nonetheless.
Please contact me if I can refocus or expand any aspect of this case, and please take a moment to provide any feedback (on the form provided) so EIC 3700 may better serve your needs.
Sincerely,

Emory Damron
Technical Information Specialist
EIC 3700, US Patent & Trademark Office
Phone: (703) 305-8587/ Fax: (703) 306-5915
Emory.damron@uspto.gov

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Search and Information Resources Administration

STIC Search Results Feedback Form

EIC 3700

Questions about the scope or the results of the search? Contact ***the EIC searcher or contact:***

John Sims, EIC 3700 Team Leader
308-4836, CP2-2C08

Voluntary Results Feedback Form

- *I am an examiner in Workgroup:* 3743 *Example: 3730*
- *Relevant prior art **found**, search results used as follows:*
  - ☐ 102 rejection
  - ☐ 103 rejection
  - ☐ Cited as being of interest.
  - ☐ Helped examiner better understand the invention.
  - ☐ Helped examiner better understand the state of the art in their technology.

  Types of relevant prior art found:
  - ☐ Foreign Patent(s)
  - ☐ Non-Patent Literature
    (journal articles, conference proceedings, new product announcements etc.)
- *Relevant prior art **not found:***
  - ☐ Results verified the lack of relevant prior art (helped determine patentability).
  - ☐ Results were not useful in determining patentability or understanding the invention.

Comments:

Drop off or send completed forms to STIC/EIC3700 CP2 2C08

Access DB# 121980

SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: ANDREA RAGONESE Examiner # : 77465 Date: 5/13/04
Art Unit: 3743 Phone Number 306-4055 Serial Number: 10/660366
Mail Box and Bldg/Room Location: PK1 11 E50 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

****

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: BAG-VALVE RESUSCITATION FOR TREATMENT OF HYPOTENTION, HEAD TRAUMA, CARD ARR

Inventors (please provide full names): LURIE, KEITH; MENK, VERN; ZIELINSKI, TODD; BIONDI, JAMES.

Earliest Priority Filing Date: 9/11/2003

**For Sequence Searches Only* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.*

SEE ATTACHED

****

STAFF USE ONLY

Searcher: Emony Damkor
Searcher Phone #: 305 8587
Searcher Location: CP2 2C8
Date Searcher Picked Up: 5/13/04 330P
Date Completed: 5/17/04 3P
Searcher Prep & Review Time: 300 min
Clerical Prep Time: 0
Online Time: 300 min

Type of Search

NA Sequence (#) ____
AA Sequence (#) ____
Structure (#) ____
Bibliographic X
Litigation ____
Fulltext X
Patent Family ____
Other ____

Vendors and cost where applicable

STN ____
Dialog X [redacted] 1484.79
Questel/Orbit ____
Dr.Link ____
Lexis/Nexis ____
Sequence Systems ____
WWW/Internet X SCIENCE / SCIENCE DIRECT
Other (specify) ____

PTO-1590 (8-01)

```
Set     Items   Description
S1         70   AU=(LURIE K? OR LURIE, K? OR MENK V? OR MENK, V? OR ZIELIN-
            SKI T? OR ZIELINSKI, T? OR BIONDI J? OR BIONDI, J?)
S2          0   KEITH(2W)LURIE OR VERN(2W)MENK OR TODD(2W)ZIELINSKI OR JAM-
            ES(2W)BIONDI
S3     182939   RESUSC? OR RESPIRAT? OR BREATH? OR VENTILAT? OR CPR OR PEEP
            OR (POSITIVE OR NEGATIVE)(2N)PRESSUR?
S4     145640   IC=(A62B? OR A61G? OR A61M?)
S5         43   S1:S2 AND S3:S4
S6         43   IDPAT (sorted in duplicate/non-duplicate order)
? show files
File 347:JAPIO Nov 1976-2003/Dec(Updated 040402)
         (c) 2004 JPO & JAPIO
File 350:Derwent WPIX 1963-2004/UD,UM &UP=200429
         (c) 2004  Thomson Derwent
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6/3,K/1 (Item 1 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2004 Thomson Derwent. All rts. reserv.

015704569 **Image available**
WPI Acc No: 2003-766762/200372
Related WPI Acc No: 1995-193914; 1996-433571; 2000-421466; 2002-139260; 2002-641994; 2002-681034; 2003-030322; 2003-310772; 2003-371349
XRPX Acc No: N03-614219

Facial mask for patients, has metronome coupled to body to produce repeating chest compression signal to facilitate performance of regular chest compressions when performing cardiopulmonary resuscitation

Patent Assignee: CPRX LLC (CPRX-N)
Inventor: **LURIE** K G ; SCHARENBROICH G; **ZIELINSKI T**
Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20030192547	A1	20031016	US 93149203	A	19931109	200372 B
			US 95403009	A	19950310	
			US 97950702	A	19971015	
			US 2000532601	A	20000322	
			US 2000546252	A	20000410	
			US 2001854238	A	20010511	
			US 2002119203	A	20020408	
			US 2002224263	A	20021105	
			US 2003396007	A	20030324	

Priority Applications (No Type Date): US 2003396007 A 20030324; US 93149203 A 19931109; US 95403009 A 19950310; US 97950702 A 19971015; US 2000532601 A 20000322; US 2000546252 A 20000410; US 2001854238 A 20010511; US 2002119203 A 20020408; US 2002224263 A 20021105

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20030192547	A1		16	A62B-018/10	CIP of application US 93149203 CIP of application US 95403009 Cont of application US 97950702 Cont of application US 2000532601 CIP of application US 2000546252 CIP of application US 2001854238 CIP of application US 2002119203 CIP of application US 2002224263 CIP of patent US 5441658 CIP of patent US 5692498 Cont of patent US 6062219 CIP of patent US 6526973 CIP of patent US 6604523

... **produce repeating chest compression signal to facilitate performance of regular chest compressions when performing cardiopulmonary** resuscitation
Inventor: **LURIE K G** ...

... **ZIELINSKI T**

Abstract (Basic):
... a patient's face, and a valve system (24) permitting the inflow and outflow of **respiratory** gases to and from the body, respectively. A metronome is coupled to the body to...

...repeating chest compression signal to facilitate the performance of regular chest compressions when performing cardiopulmonary

resuscitation .

... An INDEPENDENT CLAIM is also included for a method of performing cardio pulmonary **resuscitation** .

...

...Used for assisting a rescuer in performing appropriately timed chest compressions and in **ventilating** patients...

...mask body provides a rescuer with the ability to facilitate the proper performance of cardiopulmonary **resuscitation** without requiring extra peripheral equipment

...Title Terms: **RESUSCITATION**

International Patent Class (Main): **A62B-018/10**

6/3,K/2 (Item 2 from file: 350)

DIALOG(R)File 350:Derwent WPIX

(c) 2004 Thomson Derwent. All rts. reserv.

015469481 **Image available**

WPI Acc No: 2003-531627/200350

XRAM Acc No: C03-143545

XRPX Acc No: N03-421782

Method for administering drugs for e.g. assisting cardiac treatment, involves lowering intrathoracic pressure using valve system after introducing drug into patient, to cause blood flow into thorax

Patent Assignee: CPRX LLC (CPRX-N)

Inventor: KEITH L; WOLFGANG V; **LURIE K G** ; VOELCKEL W

Number of Countries: 100 Number of Patents: 002

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 20030062041	A1	20030403	US 2001967029	A	20010928	200350	B
WO 200328793	A1	20030410	WO 2002US24325	A	20020730	200350	

Priority Applications (No Type Date): US 2001967029 A 20010928

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20030062041	A1		9	A61M-016/00	
WO 200328793	A1	E		A61M-016/00	

Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG UZ VN YU ZA ZM ZW

Designated States (Regional): AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SK SL SZ TR TZ UG ZM ZW

...Inventor: **LURIE K G**

Abstract (Basic):

... A valve system (200) connected to the patient's airway prevents or impedes **respiratory** gases from flowing into lungs for a period of time to allow the intrathoracic pressure...

International Patent Class (Main): **A61M-016/00**

6/3,K/3 (Item 3 from file: 350)

DIALOG(R)File 350:Derwent WPIX

(c) 2004 Thomson Derwent. All rts. reserv.

015441604 **Image available**

WPI Acc No: 2003-503746/200347
XRPX Acc No: N03-399911
Medical rescue system for cardio pulmonary resuscitation **, has pressure responsive valve system to prevent flow of** respiratory **gases into patient's lungs until threshold** negative **intrathoracic** pressure **is exceeded**
Patent Assignee: GISCH T M (GISC-I); HARDER S E (HARD-I); LEYDEN M V (LEYD-I); LURIE K G (LURI-I); WAFFENSMITH J (WAFF-I); ZIELINSKI T M (ZIEL-I); CPRX LLC (CPRX-N)
Inventor: GISCH T M; HARDER S E; LEYDEN M V; **LURIE K G** ; WAFFENSMITH J; **ZIELINSKI T M**
Number of Countries: 101 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20030062040	A1	20030403	US 2001966945	A	20010928	200347 B
WO 200328613	A2	20030410	WO 2002US28568	A	20020905	200347

Priority Applications (No Type Date): US 2001966945 A 20010928
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20030062040	A1		21	A61M-016/00	
WO 200328613	A2	E		A61H-000/00	

Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG UZ VC VN YU ZA ZM ZW
Designated States (Regional): AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SK SL SZ TR TZ UG ZM ZW
Medical rescue system for cardio pulmonary resuscitation **, has pressure responsive valve system to prevent flow of** respiratory **gases into patient's lungs until threshold** negative **intrathoracic** pressure **is exceeded**
...Inventor: **LURIE K G** ...

... **ZIELINSKI T M**

Abstract (Basic):
... A pressure responsive valve system (18) prevents the flow of **respiratory** gases into the patient's lungs during decompression of the chest, until a threshold **negative** intrathoracic **pressure** is exceeded. A **ventilation** tube (20) is pivotally coupled to a swivel mount of the valve system.
... sudden cardiac arrest, loss of breadth, heart attack and heart rhythm abnormality during cardio pulmonary **resuscitation** (**CPR**), **ventilation** and defibrillation...

...The valve system augments the extent and duration of the **negative** intrathoracic **pressure** , thereby enhancing the amount of blood flow to the patient's chest...

... **Ventilation** tube (20
...Title Terms: **RESUSCITATION** ;
...International Patent Class (Main): **A61M-016/00**

6/3,K/4 (Item 4 from file: 350)
DIALOG(R)File 350:Derwent WPIX

015378270 **Image available**
WPI Acc No: 2003-439208/200341
Related WPI Acc No: 1997-319553; 1999-561889; 2001-407473
XRPX Acc No: N03-350420

Patient ventilation **system for automatically weaning patient from** ventilator **, has pressure source, spontaneous** breathing **rate monitor, minute volume flow meter and data processor**

Patent Assignee: CARDIOPULMONARY CORP (CARD-N)
Inventor: **BIONDI J W** ; LOCKHORN N; REYNOLDS R
Number of Countries: 001 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20030037786	A1	20030227	US 95569919	A	19951208	200341 B
			US 9845461	A	19980320	
			US 2000660820	A	20000913	
			US 2001767173	A	20010122	
			US 2002260796	A	20020930	
US 6668829	B2	20031230	US 95569919	A	19951208	200402
			US 9845461	A	19980320	
			US 2000660820	A	20000913	
			US 2001767173	A	20010122	
			US 2002260796	A	20020930	

Priority Applications (No Type Date): US 2001767173 A 20010122; US 95569919 A 19951208; US 9845461 A 19980320; US 2000660820 A 20000913; US 2002260796 A 20020930

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20030037786	A1		30	A61M-016/00	CIP of application US 95569919 Cont of application US 9845461 CIP of application US 2000660820 Cont of application US 2001767173 CIP of patent US 5931160 Cont of patent US 6158432 Cont of patent US 6463930
US 6668829	B2			A61M-016/00	CIP of application US 95569919 Cont of application US 9845461 CIP of application US 2000660820 Cont of application US 2001767173 CIP of patent US 5931160 Cont of patent US 6158432 Cont of patent US 6463930

Patient ventilation **system for automatically weaning patient from** ventilator **, has pressure source, spontaneous** breathing **rate monitor, minute volume flow meter and data processor**
Inventor: **BIONDI J W** ...

Abstract (Basic):
... patient weaning system (10) includes a pressure source to provide support to patient, a spontaneous **breathing** rate monitor, a device to input predetermined **breath** rate range and tidal volume, a minute flow meter and data processor connected to all the above devices, compares patient's **breath** rate with predetermined rate and minute volume.
... INDEPENDENT CLAIM is also included for the method for automatically weaning a patient from a **ventilator** .
...
...Used for automatically weaning a patient from a medical **ventilator** .
...

...The **ventilator** control system provides a clinician with complete control of patient's airway flow and pressure throughout the **respiratory** cycle, enabling to determine the optimal therapy for the patient. To decrease the work of exhalation by the patient, **negative pressure** can be applied to the exhalation circuit of patient's **ventilator** to reduce the resistance of airflow...
...The drawing shows the block diagram of the **ventilator** system...

... **Ventilator** control system (10...

... **Ventilator** (17
...Title Terms: **VENTILATION** ;
International Patent Class (Main): **A61M-016/00**

6/3,K/5 (Item 5 from file: 350)
DIALOG(R)File 350:Derwent WPIX

015330113
WPI Acc No: 2003-391048/200337
XRAM Acc No: C03-103809
Method for resuscitating **a patient from cardiac arrest comprises administrating cardiopulmonary** resuscitation **and combination of vasopressor agent(s) or vasopressinergic agonist(s), and L-arginine, nitric oxide or direct nitric oxide donor**
Patent Assignee: CPRX INC (CPRX-N)
Inventor: **LURIE K G**
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 6486206	B1	20021126	US 9788362	P	19970929	200337 B
			WO 98US20461	A	19980929	
			US 2000538432	A	20000329	

Priority Applications (No Type Date): US 9788362 P 19970929; WO 98US20461 A 19980929; US 2000538432 A 20000329
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6486206	B1		12	A61K-031/195	Provisional application US 9788362 Cont of application WO 98US20461

Method for resuscitating **a patient from cardiac arrest comprises administrating cardiopulmonary** resuscitation **and combination of vasopressor agent(s) or vasopressinergic agonist(s), and L-arginine, nitric oxide...**
Inventor: **LURIE K G**

Abstract (Basic):
... Method for **resuscitating** a patient from cardiac arrest comprises administrating...

...1) cardiopulmonary **resuscitation** (**CPR**); and...
... the compounds described in (A1) and (A2) are to be administered to a patient undergoing **CPR** ; and...

...in the dorsal recumbent position and intubated using standard endotracheal intubation technique. The pigs were **ventilated** during the preparatory phase, and after return of spontaneous circulation at

the end of the experiment with a mechanical **respirator** . The tidal volume was set at 450 cc and delivered between 11-15 **breaths** per minute with supplemental oxygen at 2 l/minute. Normal saline solution was administered intravenously...

...B) (40 microg/kg) combination, in a porcine model of ventricular fibrillation using standard cardiopulmonary **resuscitation** (**CPR**). Radiolabeled microspheres were used to measure myocardial blood flows during ventricular fibrillation prior to drug...

...For **resuscitating** a patient from cardiac arrest (claimed); for treating ventricular fibrillation involving rapid contractions and twitching...

...patient's blood pressure. The vasopressor epinephrine leads to superior vital organ blood flow during **CPR** , as compared with the conventional epinephrine therapy...

Technology Focus:

... Preferred Method: The **resuscitation** method additionally involves administration of mannitol.

Extension Abstract:

... or (e) are administered within 0-60 (preferably 0-10) minutes, after the initiation of **CPR** , for more than 10 minutes, repeated every 3-10 minutes.

...Title Terms: **RESUSCITATION** ;

6/3,K/6 (Item 6 from file: 350)

DIALOG(R)File 350:Derwent WPIX

015310415 **Image available**

WPI Acc No: 2003-371349/200335

Related WPI Acc No: 1995-193914; 1996-433571; 2000-421466; 2002-139260; 2002-641994; 2002-681034; 2003-030322; 2003-310772; 2003-766762

XRAM Acc No: C03-098421

XRPX Acc No: N03-296207

Increasing blood circulation in breathing **person, involves interfacing valve system to airway to decrease** respiratory **gas flow to lungs and permitting person to inhale and exhale through system**

Patent Assignee: CPRX LLC (CPRX-N)

Inventor: **LURIE K G**

Number of Countries: 001 Number of Patents: 002

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20030037784	A1	20030227	US 93149203	A	19931109	200335 B
			US 95403009	A	19950310	
			US 97950702	A	19971015	
			US 2000546252	A	20000410	
			US 2001854238	A	20010511	
			US 2002119203	A	20020408	
			US 2002224263	A	20021105	
US 20040016428	A9	20040129	US 93149203	A	19931109	200413
			US 95403009	A	19950310	
			US 97950702	A	19971015	
			US 2000546252	A	20000410	
			US 2001854238	A	20010511	
			US 2002119203	A	20020408	
			US 2002224263	A	20021105	

Priority Applications (No Type Date): US 2002224263 A 20021105; US 93149203 A 19931109; US 95403009 A 19950310; US 97950702 A 19971015; US 2000546252 A 20000410; US 2001854238 A 20010511; US 2002119203 A 20020408

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20030037784	A1		54	A61M-016/00	CIP of application US 93149203 CIP of application US 95403009 CIP of application US 97950702 CIP of application US 2000546252 CIP of application US 2001854238 CIP of application US 2002119203 CIP of patent US 5441658 CIP of patent US 5692498 CIP of patent US 6062219
US 20040016428	A9			A61M-016/00	CIP of application US 93149203 CIP of application US 95403009 CIP of application US 97950702 CIP of application US 2000546252 CIP of application US 2001854238 CIP of application US 2002119203 CIP of patent US 5441658 CIP of patent US 5692498 CIP of patent US 6062219 CIP of patent US 6526973 CIP of patent US 6604523

Increasing blood circulation in breathing **person, involves interfacing valve system to airway to decrease** respiratory **gas flow to lungs and permitting person to inhale and exhale through system**

Inventor: **LURIE K G**

Abstract (Basic):

... Increasing blood circulation in a **breathing** person comprises interfacing a valve system (VS) to the persons airway. The VS is configured to decrease or prevent **respiratory** gas flow to lungs during an inhalation event. The person is permitted to inhale and...

... The method spontaneously increases the blood circulation in a **breathing** person and increases the magnitude and prolongs the duration of **negative** intrathoracic **pressure** in the chest. The valve system provides a safety **ventilation** passage. The method prevents foreign (outside) air from flowing to lungs during attempted inhalations to improve and sustain the duration of **negative** intrathoracic **pressure** and improve blood oxygenation and cardiopulmonary circulation...

...Title Terms: **BREATH** ;

International Patent Class (Main): **A61M-016/00**

6/3,K/7 (Item 7 from file: 350)

DIALOG(R)File 350:Derwent WPIX

015249846 **Image available**

WPI Acc No: 2003-310772/200330

Related WPI Acc No: 1995-193914; 1996-433571; 2000-421466; 2002-139260; 2002-641994; 2002-681034; 2003-030322; 2003-371349; 2003-766762

XRPX Acc No: N03-247313

Increasing method for blood flow to the thorax by manipulating patient body where inflow valve prevents respiratory **gases from entering lungs until** negative **intrathoracic** pressure **level range is exceeded**

Patent Assignee: CPRX LLC (CPRX-N)

Inventor: GOLD B; **LURIE K G** ; SWEENEY M

Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 6526973	B1	20030304	US 93149204	A	19931109	200330 B
			US 95403009	A	19950310	
			US 97950702	A	19971015	
			US 2000546252	A	20000410	

Priority Applications (No Type Date): US 97950702 A 19971015; US 93149204 A 19931109; US 95403009 A 19950310; US 2000546252 A 20000410
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6526973	B1		24	A62B-009/02	CIP of application US 93149204 CIP of application US 95403009 Cont of application US 97950702 CIP of patent US 5551420 CIP of patent US 5692498 Cont of patent US 6062219

... **method for blood flow to the thorax by manipulating patient** body where **inflow valve prevents** respiratory **gases from entering lungs until** negative **intrathoracic** pressure **level range is exceeded**
...Inventor: **LURIE K G**

Abstract (Basic):
... The patient body is manipulated to increase magnitude and duration of patient's **negative** intrathoracic **pressure** . During manipulation, the inflow valve prevents **respiratory** gases from entering the lungs until a **negative** intrathoracic **pressure**0 level ranging from 0 to -30 cm of water is exceeded. One inflow valve assists in increasing magnitude and duration of **negative pressure** to enhance blood flow amount.
... For increasing cardiopulmonary circulation induced by chest compression and decompression when performing cardiopulmonary **resuscitation** .
...

...Amplifies the total intrathoracic pressure swing by augmentation of both negative and **positive** intrathoracic **pressure** .

...Title Terms: **RESPIRATION** ;
International Patent Class (Main): **A62B-009/02**

6/3,K/8 (Item 8 from file: 350)
DIALOG(R)File 350:Derwent WPIX

015058548 **Image available**
WPI Acc No: 2003-119064/200311
XRPX Acc No: N03-094745
Remote medical treatment system e.g. for treating heart attack, has remote device which controls treatment device by transmitting treatment control signal received from central controller in response to monitoring signal
Patent Assignee: CPRX LLC (CPRX-N)
Inventor: **LURIE K G ; ZIELINSKI T M**
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 6459933	B1	20021001	US 2000186088	P	20000309	200311 B

US 2000564889 A 20000504

Priority Applications (No Type Date): US 2000186088 P 20000309; US 2000564889 A 20000504
Patent Details:
Patent No Kind Lan Pg Main IPC Filing Notes
US 6459933 B1 10 A61N-001/39 Provisional application US 2000186088
Inventor: **LURIE K G** ...

... **ZIELINSKI T M**

Abstract (Basic):
... patients remote from medical facility during emergency situations such as sudden cardiac arrest, loss of **breath** , heart attack, arrhythmias, ventricular fibrillation, ventricular tachycardia, end tidal CO2, O2 saturation, inspiratory and expiratory...

6/3,K/9 (Item 9 from file: 350)
DIALOG(R)File 350:Derwent WPIX

014986562 **Image available**
WPI Acc No: 2003-047077/200304
XRPX Acc No: N03-037043
CPR **assistance device for patient under sudden cardiac arrest, has stethoscope system connected to applicator body to detect patient's heart beat and to disseminate heart beat information to rescuer**
Patent Assignee: CPRX LLC (CPRX-N)
Inventor: **LURIE K G ; ZIELINSKI T M**
Number of Countries: 099 Number of Patents: 001
Patent Family:
Patent No Kind Date Applicat No Kind Date Week
WO 200291905 A2 20021121 WO 2002US14038 A 20020501 200304 B

Priority Applications (No Type Date): US 2001854404 A 20010511
Patent Details:
Patent No Kind Lan Pg Main IPC Filing Notes
WO 200291905 A2 E 37 A61B-000/00
Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG UZ VN YU ZA ZM ZW
Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZM ZW

CPR **assistance device for patient under sudden cardiac arrest, has stethoscope system connected to applicator body**...
Inventor: **LURIE K G** ...

... **ZIELINSKI T M**

Abstract (Basic):
... The **CPR** assistance device (10) has an applicator body (12) for arrangement on the chest of a...
... a) a **CPR** performing method...

...b) and a **CPR** performing system...

...For use in performing cardio pulmonary **resuscitation** to patient under sudden cardiac arrest...

...determination of heart beat of patient under cardiac arrest, before, during and after performance of **CPR** to patient. Enables disseminating patient's heart beat information to rescuer so that rescuer can determined whether **CPR** should continue. Enables rapid evaluation of heart beat of patient to determine return of spontaneous circulation without requiring removal of **CPR** assistance device from patient...

...The figure shows the side view of **CPR** assistance device with internal stethoscope...

... **CPR** assistance device (10
Title Terms: **CPR** ;

6/3,K/10 (Item 10 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2004 Thomson Derwent. All rts. reserv.

014969808 **Image available**
WPI Acc No: 2003-030322/200302
Related WPI Acc No: 1995-193914; 1996-433571; 2000-421466; 2002-139260; 2002-641994; 2002-681034; 2003-310772; 2003-371349; 2003-766762
XRPX Acc No: N03-023968
Blood pressure increasing device for spontaneously breathing **patient, has inflow valve to vary** respiratory **gas flow through housing due to patient inhalation**
Patent Assignee: ADVANCED CIRCULATORY SYSTEMS INC (ADCI-N); CPRX LLC (CPRX-N)
Inventor: **LURIE K G ; ZIELINSKI T M**
Number of Countries: 101 Number of Patents: 004
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 200292169	A1	20021121	WO 2002US14039	A	20020501	200302	B
US 20020170562	A1	20021121	US 93149204	A	19931109	200323	
			US 95403009	A	19950310		
			US 97950702	A	19971015		
			US 2000546252	A	20000410		
			US 2001854238	A	20010511		
			US 2002119203	A	20020408		
US 6604523	B2	20030812	US 93149204	A	19931109	200355	
			US 95403009	A	19950310		
			US 97950702	A	19971015		
			US 2000546252	A	20000410		
			US 2001854238	A	20010511		
EP 1387714	A1	20040211	EP 2002769675	A	20020501	200411	
			WO 2002US14039	A	20020501		

Priority Applications (No Type Date): US 2002119203 A 20020408; US 2001854238 A 20010511; US 93149204 A 19931109; US 95403009 A 19950310; US 97950702 A 19971015; US 2000546252 A 20000410
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 200292169	A1	E	98	A62B-009/02	

Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG UZ VN YU ZA

ZM ZW
Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZM ZW

US 20020170562 A1 56 A62B-009/02 CIP of application US 93149204
CIP of application US 95403009
CIP of application US 97950702
CIP of application US 2000546252
CIP of application US 2001854238
CIP of patent US 5551420
CIP of patent US 5692498
CIP of patent US 6062219

US 6604523 B2 A62B-009/02 CIP of application US 93149204
CIP of application US 95403009
Cont of application US 97950702
CIP of application US 2000546252
CIP of patent US 5551420
CIP of patent US 5692498
Cont of patent US 6062219
CIP of patent US 6526973

EP 1387714 A1 E A62B-009/02 Based on patent WO 200292169
Designated States (Regional): AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI TR

Blood pressure increasing device for spontaneously breathing **patient, has inflow valve to vary** respiratory **gas flow through housing due to patient inhalation**

Inventor: **LURIE K G** ...
... **ZIELINSKI T M**

Abstract (Basic):
... interfaced with a patient's airway. An inflow valve (24) operated by a mechanism, varies **respiratory** gas flow through the housing due to patient inhalation and assists in manipulating intrathoracic pressures...
... 1) Method for increasing blood pressure in spontaneously **breathing** person...

...For increasing cardiopulmonary circulation in spontaneously **breathing** patient with severe low blood pressure or cardiac arrest...

...By varying **respiratory** gas flow through housing, the **negative** intrathoracic **pressure** is increased when the patient inhales and more blood is returned to the right heart...
...Title Terms: **BREATH** ;
International Patent Class (Main): **A62B-009/02**
International Patent Class (Additional): **A61M-016/00** ...

... **A62B-007/04**

6/3,K/11 (Item 11 from file: 350)
DIALOG(R)File 350:Derwent WPIX

014968203 **Image available**
WPI Acc No: 2003-028717/200302
XRPX Acc No: N03-022569
Ventilator **monitoring system for use in hospitals, has server comprising dedicated** ventilator **application program for each type of heterogeneous** ventilator
Patent Assignee: CARDIOPULMONARY CORP (CARD-N); BIONDI J W (BION-I); FAND A

(FAND-I)
Inventor: **BIONDI J W** ; FAND A
Number of Countries: 101 Number of Patents: 003
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 20020120676	A1	20020829	US 2001791334	A	20010223	200302	B
WO 200269181	A2	20020906	WO 2002US4515	A	20020219	200302	
EP 1399786	A2	20040324	EP 2002713602	A	20020219	200421	
			WO 2002US4515	A	20020219		

Priority Applications (No Type Date): US 2001791334 A 20010223
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20020120676	A1		21	G06F-015/16	
WO 200269181	A2	E		G06F-017/00	

Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG UZ VN YU ZA ZM ZW
Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZM ZW

EP 1399786	A2	E		G05B-019/05	Based on patent WO 200269181

Designated States (Regional): AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI TR

Ventilator **monitoring system for use in hospitals, has server comprising dedicated** ventilator **application program for each type of heterogeneous** ventilator
Inventor: **BIONDI J W** ...

Abstract (Basic):
... A server (36) comprises a dedicated **ventilator** application program (50) for each type of heterogeneous **ventilators** (20), and a database (44) storing data from the **ventilators** . A listener/pollster transmits requests to and receives data from the **ventilators** , through a data access point, and passes requests to and data from the program. A...
... **Ventilator** monitoring system for use in hospitals and other health-care institutions...

...Enables monitoring and collection of data such as **ventilator** settings, measured patient values, alarm conditions, etc., from heterogeneous **ventilators** , for display at a central monitoring station...

...The figure shows the block diagram of the **ventilator** monitoring system ...

... **Ventilator** (20
Title Terms: **VENTILATION** ;

6/3,K/12 (Item 12 from file: 350)
DIALOG(R)File 350:Derwent WPIX

014860328 **Image available**
WPI Acc No: 2002-681034/200273
Related WPI Acc No: 1995-193914; 1996-433571; 2000-421466; 2002-139260; 2002-641994; 2003-030322; 2003-310772; 2003-371349; 2003-766762

XRPX Acc No: N02-537515

Person's ventilation **altering method for providing** positive **expiratory** pressure **involves controlling valve opening depending upon the specific actuating pressure which is varied over time**

Patent Assignee: CPRX LLC (CPRX-N)

Inventor: **LURIE K G** ; VOELCKEL W; **ZIELINSKI T**

Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 6425393	B1	20020730	US 93149240	A	19931109	200273 B
			US 95403009	A	19950310	
			US 97950702	A	19971015	
			US 99386868	A	19990831	

Priority Applications (No Type Date): US 99386868 A 19990831; US 93149240 A 19931109; US 95403009 A 19950310; US 97950702 A 19971015

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6425393	B1		18	A62B-007/00	CIP of application US 93149240
					CIP of application US 95403009
					CIP of application US 97950702
					CIP of patent US 5551420
					CIP of patent US 5692498
					CIP of patent US 6062219

Person's ventilation **altering method for providing** positive **expiratory** pressure **involves controlling valve opening depending upon the specific actuating pressure which is varied over time**

Inventor: **LURIE K G** ...

... **ZIELINSKI T**

Abstract (Basic):

... An exit valve is opened or closed to block/permit **respiratory** gases from/to patient's lungs. The valve is opened when specific actuating pressure is...

... An INDEPENDENT CLAIM is included for method for performing cardiopulmonary **resuscitation** .

...

...For providing **positive** expiratory **pressure** (PEP...

...oxygenation while maintaining and/or increasing coronary perfusion pressure, thereby increasing the procedure of cardiopulmonary **resuscitation** (**CPR**) procedure...

...The figure shows the flow chart illustrating method for performing **CPR** using an exit valve to alter the person's PEP over time

...Title Terms: **VENTILATION** ;

International Patent Class (Main): **A62B-007/00**

6/3,K/13 (Item 13 from file: 350)

DIALOG(R)File 350:Derwent WPIX

014821288 **Image available**

WPI Acc No: 2002-641994/200269

Related WPI Acc No: 1995-193914; 1996-433571; 2000-421466; 2002-139260; 2002-681034; 2003-030322; 2003-310772; 2003-371349; 2003-766762

XRAM Acc No: C04-014016

XRPX Acc No: N04-029046

Increasing cardiopulmonary circulation during cardiopulmonary resuscitation involves using pressure-responsive inflow valve which prevents respiratory gas from entering patient's lungs during chest decompression

Patent Assignee: CPRX LLC (CPRX-N)

Inventor: **LURIE K G ; ZIELINSKI T M**

Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20020069878	A1	20020613	US 93149204	A	19931109	200269 B
			US 95403009	A	19950310	
			US 97950702	A	19971015	
			US 2000546252	A	20000410	
			US 2001854238	A	20010511	

Priority Applications (No Type Date): US 2001854238 A 20010511; US 93149204 A 19931109; US 95403009 A 19950310; US 97950702 A 19971015; US 2000546252 A 20000410

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20020069878	A1		45	A62B-007/00	CIP of application US 93149204 CIP of application US 95403009 Cont of application US 97950702 CIP of application US 2000546252

Increasing cardiopulmonary circulation during cardiopulmonary resuscitation involves using pressure-responsive inflow valve which prevents respiratory gas from entering patient's lungs during chest decompression

Inventor: **LURIE K G ...**

... **ZIELINSKI T M**

Abstract (Basic):

... Cardiopulmonary circulation during cardiopulmonary **resuscitation** is increased by interfacing valving system having pressure-responsive inflow valve to a patient's airway, performing chest compression and decompression, and supplying pressurized **respiratory** gas via the inflow valve. The inflow valve prevents **respiratory** gas from entering the lungs during chest decompression.

... Increasing cardiopulmonary circulation during cardiopulmonary **resuscitation** includes interfacing a valving system with a patient's airway, performing chest compression and decompression, and supplying pressurized **respiratory** gas to the patient. The valving system comprises a housing having upstream and downstream regions, and a pressure-responsive valve to prevent **respiratory** gas from flowing from the upstream region to the downstream region until the pressure in the downstream region falls below a threshold level. During chest decompression, the inflow valve prevents **respiratory** gas from entering the lungs until a predetermined **negative** intra-thoracic **pressure** level is exceeded at which time the inflow valve opens. The inflow valve assists in increasing the magnitude and duration of **negative** intra-thoracic **pressure** during decompression and enhances the amount of blood flow into the heart and lungs. The pressurized **respiratory** gas is supplied via the inflow valve when the valve opens to **ventilate** the patient. An INDEPENDENT CLAIM is included for a device for carrying out the method...

...is used in increasing cardiopulmonary circulation induced by chest compression and decompression when performing cardiopulmonary **resuscitation** . It is useful in increasing blood pressure in

spontaneously **breathing** person having low blood pressure secondary to vasovagal syncope or due to blood loss, administration...
Technology Focus:
... valve to the patient's airway to prevent air from leaving the lungs until a **positive** intra-thoracic **pressure** of 2-20 cm H2O is exceeded at which time the exhalation valve opens. The...

...Preferred Parameters: The **negative** intra-thoracic **pressure** is -3 to -30 cm H2O. The **respiratory** gas has a pressure that is less than the opening pressure of inflow valve...

...than the actuating pressure of the inflow valve, and a safety mechanism for maintaining safety **ventilation** passageway open to permit **respiratory** gas to freely flow to the patient's lungs until actuated by a rescuer. The...

...of the shaft. The safety mechanism comprises a sensor to detect when the rescuer injects **respiratory** gas into the housing, and a control system to move the inflow valve from open...
...Title Terms: **RESUSCITATION** ;
International Patent Class (Main): **A62B-007/00**
International Patent Class (Additional): **A62B-009/00**

6/3,K/14 (Item 14 from file: 350)
DIALOG(R)File 350:Derwent WPIX

014447044 **Image available**
WPI Acc No: 2002-267747/200231
Related WPI Acc No: 1995-223538; 1996-401428; 1998-178372; 2000-012719; 2000-104863; 2001-513528; 2003-066281
XRPX Acc No: N02-208214
Precurved coronary sinus guiding introducer, has lumen extending through elongated member, from the straight proximal section to the distal section which curves through an arc of about 50 to 150 degrees
Patent Assignee: DAIG CORP (DAIG-N); ST JUDE MEDICAL INC (SJUD-N)
Inventor: BENDITT D G; BLANC J J; **LURIE K G** ; STARKS D J
Number of Countries: 001 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20020029030	A1	20020307	US 97853631	A	19970509	200231 B
			US 2001930315	A	20010815	
US 6656166	B2	20031202	US 93106383	A	19930813	200379
			US 95371849	A	19950112	
			US 96625908	A	19960401	
			US 97853631	A	19970509	
			US 2001930315	A	20010815	

Priority Applications (No Type Date): US 97853631 A 19970509; US 2001930315 A 20010815; US 93106383 A 19930813; US 95371849 A 19950112; US 96625908 A 19960401
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20020029030	A1		18	A61M-005/178	Div ex application US 97853631
					Div ex patent US 6277107
US 6656166	B2			A61M-005/00	Cont of application US 93106383
					Cont of application US 95371849
					CIP of application US 96625908
					Div ex application US 97853631
					Cont of patent US 5423772

Cont of patent US 5549581
CIP of patent US 5722963
Div ex patent US 6277107

...Inventor: **LURIE K G**
International Patent Class (Main): **A61M-005/00** ...

... **A61M-005/178**

6/3,K/15 (Item 15 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2004 Thomson Derwent. All rts. reserv.

014396229 **Image available**
WPI Acc No: 2002-216932/200227
Related WPI Acc No: 2001-431720
XRPX Acc No: N02-166293
Cardiopulmonary resuscitation **training apparatus for use to train individuals to do** resuscitation **has inflatable bladder beneath flexible compression platform included in compression compartment**
Patent Assignee: CPRX LLC (CPRX-N)
Inventor: **LURIE K G ; ZIELINSKI T M**
Number of Countries: 095 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 200203905	A2	20020117	WO 2001US22180	A	20010710	200227	B
AU 200182889	A	20020121	AU 200182889	A	20010710	200234	

Priority Applications (No Type Date): US 2000614064 A 20000711
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 200203905	A2	E	30	A61H-000/00	

Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZW

AU 200182889	A		A61H-000/00	Based on patent WO 200203905	

Cardiopulmonary resuscitation **training apparatus for use to train individuals to do** resuscitation **has inflatable bladder beneath flexible compression platform included in compression compartment**
Inventor: **LURIE K G** ...

... **ZIELINSKI T M**

Abstract (Basic):
... To train individuals to do **CPR** (Cardiopulmonary **Resuscitation**).
...

...The drawing shows a **CPR** training device
Title Terms: **RESUSCITATION** ;

6/3,K/16 (Item 16 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2004 Thomson Derwent. All rts. reserv.

014393541 **Image available**
WPI Acc No: 2002-214244/200227
Related WPI Acc No: 2000-105799; 2001-569813; 2002-139267
XRPX Acc No: N02-163874
Cardiopulmonary circulation increasing method for cardiopulmonary resuscitation , involves simulating diaphragm to contract, to suddenly increase negative intrathoracic pressure during recovery phase
Patent Assignee: CPRX LLC (CPRX-N)
Inventor: BENDITT D G; **LURIE K G**
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 6234985	B1	20010522	US 9895916	A	19980611	200227	B

Priority Applications (No Type Date): US 9895916 A 19980611
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6234985	B1		18	A61H-031/00	

Cardiopulmonary circulation increasing method for cardiopulmonary resuscitation , involves simulating diaphragm to contract, to suddenly increase negative intrathoracic pressure during recovery phase
...Inventor: **LURIE K G**

Abstract (Basic):
... A patient's chest is actively compressed during a compression phase of the cardiopulmonary **resuscitation** (**CPR**). The diaphragm is simulated to contract to cause a sudden rise in the magnitude and duration of **negative** intrathoracic **pressure** during a recovery phase so as to enhance the amount of venous blood flow into...
... a) Cardiopulmonary **resuscitation** method...

...b) Cardiopulmonary **resuscitation** assistance device...

...For increasing cardiopulmonary circulation during cardiopulmonary **resuscitation** (**CPR**) such as standard, manual, closed chest **CPR** , interposed abdominal counter pulsation **CPR** , ACD- **CPR** , Lifestick' **CPR** , etc...

...The figure illustrate a cardiopulmonary **resuscitation** assistance device when used to treat a patient...
...Title Terms: **RESUSCITATION** ;

6/3,K/17 (Item 17 from file: 350)
DIALOG(R)File 350:Derwent WPIX

014318565 **Image available**
WPI Acc No: 2002-139267/200218
Related WPI Acc No: 2000-105799; 2001-569813; 2002-214244
XRPX Acc No: N02-105012
Increasing method for blood flow to thorax of patient periodically stimulating phrenic nerve and periodically occluding airflow to lungs
Patent Assignee: CPRX LLC (CPRX-N)
Inventor: LINDNER K; **LURIE K G** ; MCKNITE S; PATTERSON R; SAMNIAH N; VOELCKEL W; **ZIELINSKI T M**
Number of Countries: 094 Number of Patents: 005
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week

WO 200170332	A2	20010927	WO 2001US8687	A	20010316	200218	B
AU 200145852	A	20011003	AU 200145852	A	20010316	200218	
US 6463327	B1	20021008	US 9895916	A	19980611	200269	
			US 98197286	A	19981120		
			US 99315396	A	19990520		
			US 2000533880	A	20000322		
US 20020188332	A1	20021212	US 9895916	A	19980611	200301	
			US 98197286	A	19981120		
			US 99315396	A	19990520		
			US 2000533880	A	20000322		
			US 2002158528	A	20020529		
US 6587726	B2	20030701	US 9895916	A	19980611	200345	
			US 98197286	A	19981120		
			US 99315396	A	19990520		
			US 2000533880	A	20000322		
			US 2002158528	A	20020529		

Priority Applications (No Type Date): US 2000533880 A 20000322; US 9895916 A 19980611; US 98197286 A 19981120; US 99315396 A 19990520; US 2002158528 A 20020529

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 200170332	A2	E	80	A61N-000/00	
					Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
					Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZW
AU 200145852	A			A61N-000/00	Based on patent WO 200170332
US 6463327	B1			A61N-001/36	CIP of application US 9895916 CIP of application US 98197286 CIP of application US 99315396 CIP of patent US 6224562 CIP of patent US 6234985
US 20020188332	A1			A61N-001/18	CIP of application US 9895916 CIP of application US 98197286 CIP of application US 99315396 Cont of application US 2000533880 CIP of patent US 6224562 CIP of patent US 6234985 CIP of patent US 6312399
US 6587726	B2			A61N-001/18	CIP of application US 9895916 CIP of application US 98197286 CIP of application US 99315396 Cont of application US 2000533880 CIP of patent US 6224562 CIP of patent US 6234985 CIP of patent US 6312399 Cont of patent US 6463327

...Inventor: **LURIE K G** ...
... **ZIELINSKI T M**

...Abstract (Basic): cause the diaphragm to contract and cause an increase in the magnitude and duration of **negative** intrathoracic **pressure** . The airflow to the lungs is periodically occluded during contraction of the diaphragm with a...

...control airflow into the patient's airway to further increase the magnitude and duration of **negative** intrathoracic **pressure** . This

forces more blood into the thorax...

...DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for a method for **ventilating** a patient, for a method of increasing blood flow to the thorax, for a medical...

...USE - For cardiopulmonary **resuscitation** .
...

...ADVANTAGE - Improved patient **ventilation** , especially if intubation is undesirable or where **ventilation** can result in bursting of pulmonary alveoli and bronchioles...
...DESCRIPTION OF DRAWING(S) - The figure shows a **respiratory** muscle stimulation device

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6/3,K/18 (Item 18 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2004 Thomson Derwent. All rts. reserv.

014318558 **Image available**
WPI Acc No: 2002-139260/200218
Related WPI Acc No: 1995-193914; 1996-433571; 2000-421466; 2002-641994; 2002-681034; 2003-030322; 2003-310772; 2003-371349; 2003-766762
XRPX Acc No: N02-105005
Facial resuscitation mask has metronome with power supply in replaceable module
Patent Assignee: CPRX LLC (CPRX-N); ADVANCED CIRCULATORY SYSTEMS INC (ADCI-N)
Inventor: **LURIE K G** ; SCHARENBROICH G; **ZIELINSKI T M**
Number of Countries: 094 Number of Patents: 004
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 200170092	A2	20010927	WO 2001US8505	A	20010316	200218	B
AU 200149233	A	20011003	AU 200149233	A	20010316	200218	
EP 1337292	A2	20030827	EP 2001922429	A	20010316	200357	
			WO 2001US8505	A	20010316		
JP 2004509654	W	20040402	JP 2001568295	A	20010316	200424	
			WO 2001US8505	A	20010316		

Priority Applications (No Type Date): US 2000532601 A 20000322
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 200170092	A2	E	26	A61B-000/00	
Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW				
Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZW					
AU 200149233	A				Based on patent WO 200170092
EP 1337292	A2	E		A61M-015/00	Based on patent WO 200170092
Designated States (Regional): AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR					
JP 2004509654	W		46	A61M-016/06	Based on patent WO 200170092

Facial resuscitation mask has metronome with power supply in replaceable module
Inventor: **LURIE K G** ...

... **ZIELINSKI T M**

...Abstract (Basic): NOVELTY - Mask comprises a valve (24) enabling **respiratory** gases to flow into and out of the mask body (12) and a metronome (26...

...chest compression signal at 50-100 signals per minute facilitating regular chest compressions when performing **CPR** . The metronome has a light (36) and speaker (34), the bottom end of the mask...

...DETAILED DESCRIPTION - There are INDEPENDENT CLAIMS for (1) a **CPR** method, (2) a **CPR** kit...

...USE - Mask is for use in cardiopulmonary **resuscitation** .

...Title Terms: **RESUSCITATION** ;
...International Patent Class (Main): **A61M-015/00** ...

... **A61M-016/06**
...International Patent Class (Additional): **A61M-016/20**

6/3,K/19 (Item 19 from file: 350)
DIALOG(R)File 350:Derwent WPIX

014085599 **Image available**
WPI Acc No: 2001-569813/200164
Related WPI Acc No: 2000-105799; 2002-139267; 2002-214244
XRPX Acc No: N01-424612
Cardiopulmonary circulation enhancement in cardiopulmonary resuscitation **, involves increasing amount of venous blood flow to heart and lungs by increasing magnitude and duration of** negative **intrathoracic** pressure
Patent Assignee: CPRX LLC (CPRX-N)
Inventor: BENDITT D G; **LURIE K G**
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 6224562	B1	20010501	US 9895916	A	19980611	200164 B
			US 98197286	A	19981120	

Priority Applications (No Type Date): US 9895916 A 19980611; US 98197286 A 19981120
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6224562	B1		18	A61H-031/00	Cont of application US 9895916

Cardiopulmonary circulation enhancement in cardiopulmonary resuscitation **, involves increasing amount of venous blood flow to heart and lungs by increasing magnitude and duration of** negative **intrathoracic** pressure
...Inventor: **LURIE K G**

Abstract (Basic):
... The patient's chest is actively compressed during the compression phase. Some of the **respiratory** muscles are stimulated to contract, to increase the magnitude and duration of **negative** intrathoracic **pressure** during decompression phase. The increase in the magnitude and duration of **negative** intrathoracic **pressure** enhances the amount of venous blood flow into the heart and lungs.
... The **respiratory** muscles are stimulated to contract at a frequency range of 30-120 times per minute, by applying electric

current to phrenic nerve. An INDEPENDENT CLAIM is also included for cardiopulmonary **resuscitation** device...

...For increasing cardiopulmonary circulation during cardiopulmonary **resuscitation** procedures...

...Cardiopulmonary circulation is increased during cardiopulmonary **resuscitation** procedures by enhancing the amount of venous blood flow to heart and lungs. The amount of **negative** intrathoracic **pressure** generated by contraction of **respiratory** muscles are used to adjust energy needed for subsequent contractions, hence **respiratory** muscles stimulating system can be located in emergency vehicle or health care facility...

...The figure shows the schematic view of **respiratory** muscle stimulation device...
...Title Terms: **RESUSCITATION** ;

6/3,K/20 (Item 20 from file: 350)
DIALOG(R)File 350:Derwent WPIX

014029314 **Image available**
WPI Acc No: 2001-513528/200156
Related WPI Acc No: 1995-223538; 1996-401428; 1998-178372; 2000-012719; 2000-104863; 2002-267747; 2003-066281
XRPX Acc No: N01-380345
Introducer for guiding devices into the coronary sinus has a distal section whose straight proximal part is joined by a curved intermediate part to a terminal part curved in a plane at an acute angle to that of the intermediate part
Patent Assignee: DAIG CORP (DAIG-N)
Inventor: BENDITT D G; BLANC J J; **LURIE K G** ; STARKS D J
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 6277107	B1	20010821	US 93106383	A	19930813	200156 B
			US 95371849	A	19950112	
			US 96625908	A	19960401	
			US 97853631	A	19970509	

Priority Applications (No Type Date): US 97853631 A 19970509; US 93106383 A 19930813; US 95371849 A 19950112; US 96625908 A 19960401
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6277107	B1		17	A61M-025/01	Cont of application US 93106383 Cont of application US 95371849 CIP of application US 96625908 Cont of patent US 5423772 Cont of patent US 5549581 CIP of patent US 5722963

...Inventor: **LURIE K G**
International Patent Class (Main): **A61M-025/01**

6/3,K/21 (Item 21 from file: 350)
DIALOG(R)File 350:Derwent WPIX

013923260 **Image available**
WPI Acc No: 2001-407473/200143
Related WPI Acc No: 1999-561889; 2003-439208
XRPX Acc No: N01-301437

Automatic weaning of patient from medical ventilator **, involves adjusting patient support level according to comparison results of patient spontaneous** breathing **rate and minute volume with preset range**

Patent Assignee: CARDIOPULMONARY CORP (CARD-N); BIONDI J W (BION-I); LOCKHORN N (LOCK-I); REYNOLDS R (REYN-I)

Inventor: **BIONDI J W** ; LOCKHORN N; REYNOLDS R

Number of Countries: 101 Number of Patents: 005

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 20010004893	A1	20010628	US 95569919	A	19951208	200143	B
			US 9845461	A	19980320		
			US 2000660820	A	20000913		
			US 2001767173	A	20010123		
WO 200258619	A2	20020801	WO 2002US1716	A	20020122	200260	
US 6463930	B2	20021015	US 95569919	A	19951208	200271	
			US 9845461	A	19980320		
			US 2000660820	A	20000913		
			US 2001767173	A	20010123		
EP 1355690	A2	20031029	EP 2002704199	A	20020122	200379	
			WO 2002US1716	A	20020122		
AU 2002237895	A1	20020806	AU 2002237895	A	20020122	200427	

Priority Applications (No Type Date): US 2001767173 A 20010123; US 95569919 A 19951208; US 9845461 A 19980320; US 2000660820 A 20000913

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20010004893	A1		30	A62B-007/00	CIP of application US 95569919 Cont of application US 9845461 CIP of application US 2000660820 CIP of patent US 5931160 Cont of patent US 6158432
WO 200258619	A2	E		A61H-031/00	

Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG UZ VN YU ZA ZM ZW

Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZM ZW

US 6463930	B2			A61M-016/00	CIP of application US 95569919 Cont of application US 9845461 CIP of application US 2000660820 CIP of patent US 5931160 Cont of patent US 6158432
EP 1355690	A2	E		A61M-016/00	Based on patent WO 200258619

Designated States (Regional): AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI TR

AU 2002237895	A1			A61H-031/00	Based on patent WO 200258619

Automatic weaning of patient from medical ventilator **, involves adjusting patient support level according to comparison results of patient spontaneous** breathing **rate and minute volume with preset range**

Inventor: **BIONDI J W** ...

Abstract (Basic):

... system (41) with pressurized gas source (45). A data processor (30) detects and measures spontaneous **breathing** rate of patient. A

flow meter (11) measures patient's minute volume. The detected **breathing** rate and measured minute volume are compared with preset range of **breathing** rates and preset tidal volume respectively, based on which the processor adjusts patient's support...

... An INDEPENDENT CLAIM is also included for **ventilator** system for automatically weaning patient from **ventilator** .

...

...For control of **ventilator** pneumatic system in medical **ventilator** .

...

...Automatically weans a patient from **ventilator** and reduces air-way resistance in the **breathing** circuit during exhalation and enables the clinician to determine the optimal therapy for the patient...

...The figure shows the block diagram of **ventilator** .

...Title Terms: **VENTILATION** ;
...International Patent Class (Main): **A61M-016/00** ...

... **A62B-007/00**

6/3,K/22 (Item 22 from file: 350)
DIALOG(R)File 350:Derwent WPIX

013249583 **Image available**
WPI Acc No: 2000-421466/200036
Related WPI Acc No: 1995-193914; 1996-433571; 2002-139260; 2002-641994; 2002-681034; 2003-030322; 2003-310772; 2003-371349; 2003-766762
XRPX Acc No: N00-314350

Apparatus and methods for assisting cardiopulmonary resuscitation **that incorporates a transition tube, which connects the endotracheal tube to the** ventilation **bag, the** ventilation **valve serves to introduce air into the device**

Patent Assignee: CPRX LLC (CPRX-N)
Inventor: GOLD B; **LURIE K G** ; SWEENEY M
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 6062219	A	20000516	US 93149204	A	19931109	200036	B
			US 95403009	A	19950310		
			US 97950702	A	19971015		

Priority Applications (No Type Date): US 97950702 A 19971015; US 93149204 A 19931109; US 95403009 A 19950310
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6062219	A		23	A62B-009/02	CIP of application US 93149204
					CIP of application US 95403009
					CIP of patent US 5551420
					CIP of patent US 5692498

Apparatus and methods for assisting cardiopulmonary resuscitation **that incorporates a transition tube, which connects the endotracheal tube to the** ventilation **bag, the** ventilation **valve serves to introduce air into the device**

...Inventor: **LURIE K G**

Abstract (Basic):

... consists an endotracheal tube (36), which is placed into the patients trachea and provides a **ventilation** passageway. Connected is a transition tube (38), which connects the endotracheal tube to the **ventilation** bag (28). The **ventilation** valve (26) serves to introduce air into the device. Attached or connected to the transition...

...airflow responsive valve (24). The inflow valve is biased so that it opens when the **negative** intrathoracic **pressure** in the patients chest reaches a threshold amount.

... External chest compression and decompression as part of the cardiopulmonary **resuscitation** procedures...

...Properly **ventilate** the patient with air, in a controlled manner...

... **Ventilation** valve (26...

... **Ventilation** tube (28

...Title Terms: **RESUSCITATION ;**

International Patent Class (Main): **A62B-009/02**

International Patent Class (Additional): **A61M-016/00** ...

... **A62B-007/10**

6/3,K/23 (Item 23 from file: 350)

DIALOG(R)File 350:Derwent WPIX

013145782 **Image available**

WPI Acc No: 2000-317654/200027

XRPX Acc No: N00-238437

Cardiopulmonary resuscitation ventilator **for** ventilating **patient uses** ventilator **to periodically supply** respiratory **gases to patient's lungs using sensor to detect chest compressions by sensing intrathoracic pressure changes**

Patent Assignee: CPRX LLC (CPRX-N)

Inventor: **LURIE K G ; ZIELINSKI T M**

Number of Countries: 090 Number of Patents: 004

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 200020061	A1	20000413	WO 99US23233	A	19991005	200027	B
AU 9964164	A	20000426	AU 9964164	A	19991005	200036	
US 6155257	A	20001205	US 98168049	A	19981007	200066	
EP 1119385	A1	20010801	EP 99951803	A	19991005	200144	
			WO 99US23233	A	19991005		

Priority Applications (No Type Date): US 98168049 A 19981007

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 200020061	A1	E	55	A61M-016/00	

Designated States (National): AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW

Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL OA PT SD SE SL SZ TZ UG ZW

AU 9964164	A	A61M-016/00	Based on patent WO 200020061
US 6155257	A	A61M-016/00	
EP 1119385	A1 E	A61M-016/00	Based on patent WO 200020061

Designated States (Regional): AL AT BE CH CY DE DK ES FI FR GB GR IE IT

LI LT LU LV MC MK NL PT RO SE SI
Cardiopulmonary resuscitation ventilator **for** ventilating **patient uses** ventilator **to periodically supply** respiratory **gases to patient's lungs using sensor to detect chest compressions by sensing intrathoracic pressure...**
Inventor: **LURIE K G** ...

... **ZIELINSKI T M**

Abstract (Basic):
... The cardiopulmonary **resuscitation ventilator ventilates** a patient using a **ventilator** (12) to periodically supply **respiratory** gases to patient's lungs and uses a sensor (14) to detect chest compressions by...

...pressure changes. A controller is coupled to the sensor to control the action of the **ventilator** after a predetermined number of chest compressions are detected by the sensor.
... As a cardiopulmonary **resuscitation ventilator** for **ventilating** a patient...

...Easily and conveniently co-ordinates the timing of chest compressions with the **ventilation** , and precisely controls the volume of **respiratory** gases delivered to the patient...

...The drawing shows a schematic view of the **ventilator** coupled to a valve with a sensor to detect chest compressions by sensing changes in ...

... **ventilator** (12
Title Terms: **RESUSCITATION** ;
International Patent Class (Main): **A61M-016/00**

6/3,K/24 (Item 24 from file: 350)
DIALOG(R)File 350:Derwent WPIX

013065040 **Image available**
WPI Acc No: 2000-236912/200020
XRPX Acc No: N00-177652
Heart failure mask and methods for increasing negative **intrathoracic** pressures **that incorporates an airflow controller**
Patent Assignee: CPRX LLC (CPRX-N)
Inventor: **LURIE K G**
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 6029667	A	20000229	US 96747371	A	19961112	200020 B
			US 9819843	A	19980206	

Priority Applications (No Type Date): US 9819843 A 19980206; US 96747371 A 19961112
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6029667	A		9	A61M-016/00	CIP of application US 96747371 CIP of patent US 5730122

Heart failure mask and methods for increasing negative **intrathoracic** pressures **that incorporates an airflow controller**
Inventor: **LURIE K G**

Abstract (Basic):
... includes an inflow hole (36) and a pair of outflow holes (38). The holes allow **respiratory** gasses to flow into and out from mask (12), when valves (22) and (24) are...

...The treatment proceeds by preventing **respiratory** gasses from entering the patients lungs during inhalation until a **negative** intrathoracic **pressure** within a desired range is developed within the patient...
International Patent Class (Main): **A61M-016/00**
International Patent Class (Additional): **A62B-018/02** ...

... **A62B-018/10**

6/3,K/25 (Item 25 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2004 Thomson Derwent. All rts. reserv.

012933952 **Image available**
WPI Acc No: 2000-105799/200009
Related WPI Acc No: 2001-569813; 2002-139267; 2002-214244
XRPX Acc No: N00-081272
Method for increasing cardiopulmonary circulation when performing cardiopulmonary resuscitation
Patent Assignee: CPRX LLP (CPRX-N); CPRX LLC (CPRX-N); ADVANCED CIRCULATORY SYSTEMS INC (ADCI-N)
Inventor: BENDITT D G; **LURIE K G** ; PATTERSON R; VOECKEL W; **ZIELINSKI T M**
Number of Countries: 086 Number of Patents: 006
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 9963926	A2	19991216	WO 99US13161	A	19990610	200009	B
AU 9944352	A	19991230	AU 9944352	A	19990610	200022	
BR 9911093	A	20010220	BR 9911093	A	19990610	200114	
			WO 99US13161	A	19990610		
EP 1098622	A2	20010516	EP 99927453	A	19990610	200128	
			WO 99US13161	A	19990610		
US 6312399	B1	20011106	US 9895916	A	19980611	200170	
			US 98197286	A	19981120		
			US 99315396	A	19990520		
JP 2002517283	W	20020618	WO 99US13161	A	19990610	200242	
			JP 2000553001	A	19990610		

Priority Applications (No Type Date): US 99315396 A 19990520; US 9895916 A 19980611; US 98197286 A 19981120
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 9963926	A2	E	51	A61H-000/00	
Designated States (National): AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG UZ VN YU ZA ZW					
Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL OA PT SD SE SL SZ UG ZW					
AU 9944352	A				Based on patent WO 9963926
BR 9911093	A			A61N-001/36	Based on patent WO 9963926
EP 1098622	A2	E		A61H-001/00	Based on patent WO 9963926
Designated States (Regional): DE FR GB					
US 6312399	B1			A61H-031/00	CIP of application US 9895916
					CIP of application US 98197286

CIP of patent US 6224562
CIP of patent US 6234985
JP 2002517283 W 48 A61M-016/04 Based on patent WO 9963926

Method for increasing cardiopulmonary circulation when performing cardiopulmonary resuscitation

...Inventor: **LURIE K G** ...

... **ZIELINSKI T M**

Abstract (Basic):

... **Respiratory** muscles are stimulated during a decompression phase by applying electric or magnetic energy to the...

...cause the patient to gasp. The energy is applied such that magnitude and duration of **negative** intrathoracic **pressure** is increased, to enhance flow of blood in heart and lungs.

... During stimulation, the **respiratory** muscles contract at a specific frequency between 30-120 times per minute. **Respiratory** gases may be supplied to the lung...

...INDEPENDENT CLAIMS are also included for a device to assist in cardiopulmonary **resuscitation** , a stimulation system, a system for producing a cough and a kit for cardiopulmonary **resuscitation** including the device...

...For cardiopulmonary **resuscitation** for treatment of sudden cardiac arrests...

...Enhances cardiopulmonary **resuscitation** , as electric or magnetic pulses are applied for muscle stimulation...

...The figure shows a top plan view of a **respiratory** muscle stimulation device...

...Title Terms: **RESUSCITATION**

...International Patent Class (Main): **A61M-016/04**

6/3,K/26 (Item 26 from file: 350)

DIALOG(R)File 350:Derwent WPIX

012933016 **Image available**

WPI Acc No: 2000-104863/200009

Related WPI Acc No: 1995-223538; 1996-401428; 1998-178372; 2000-012719; 2001-513528; 2002-267747; 2003-066281

XRPX Acc No: N00-080524

Cardiac catheter for use in coronary sinus of human heart

Patent Assignee: DAIG CORP (DAIG-N)

Inventor: BENDITT D G; FLEISCHHACKER J J; **LURIE K G** ; OCKULY J D; SHULTZ J J

Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 6001085	A	19991214	US 93106383	A	19930813	200009 B
			US 95371849	A	19950112	
			US 96625908	A	19960401	
			US 97996887	A	19971223	

Priority Applications (No Type Date): US 93106383 A 19930813; US 95371849 A

19950112; US 96625908 A 19960401; US 97996887 A 19971223
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6001085	A		9	A61M-025/00	Cont of application US 93106383
					Cont of application US 95371849
					Cont of application US 96625908
					Cont of patent US 5423772
					Cont of patent US 5549581
					Cont of patent US 5722963

...Inventor: **LURIE K G**
International Patent Class (Main): **A61M-025/00**

6/3,K/27 (Item 27 from file: 350)
DIALOG(R)File 350:Derwent WPIX
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012840887 **Image available**
WPI Acc No: 2000-012719/200001
Related WPI Acc No: 1995-223538; 1996-401428; 1998-178372; 2000-104863; 2001-513528; 2002-267747; 2003-066281
XRPX Acc No: N00-009891
Coronary sinus catheter
Patent Assignee: DAIG CORP (DAIG-N)
Inventor: BENDITT D G; FLEISCHHACKER J J; **LURIE K G** ; OCKULY J D; SHULTZ J J
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 5984909	A	19991116	US 93106383	A	19930813	200001 B
			US 95371849	A	19950112	
			US 97996887	A	19971223	
			US 98146857	A	19980903	

Priority Applications (No Type Date): US 93106383 A 19930813; US 95371849 A 19950112; US 97996887 A 19971223; US 98146857 A 19980903
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 5984909	A		10	A61M-025/00	Cont of application US 93106383
					Cont of application US 95371849
					Cont of application US 97996887
					Cont of patent US 5423772
					Cont of patent US 5549581

...Inventor: **LURIE K G**
International Patent Class (Main): **A61M-025/00**

6/3,K/28 (Item 28 from file: 350)
DIALOG(R)File 350:Derwent WPIX
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012755772 **Image available**
WPI Acc No: 1999-561889/199947
Related WPI Acc No: 1997-319553; 2001-407473; 2003-439208
XRPX Acc No: N99-415169
Compensating gas flow resistance in ventilation **apparatus for controlling** ventilator **pneumatic system**
Patent Assignee: BIONDI J W (BION-I); GILMORE D D (GILM-I); JOHNSTON D M (JOHN-I); REYNOLDS R (REYN-I); SCHROEDER G P (SCHR-I); CARDIOPULMONARY CORP (CARD-N)

Inventor: **BIONDI J W** ; GILMORE D D; JOHNSTON D M; REYNOLDS R; SCHROEDER G P; JOHNSON D M
Number of Countries: 020 Number of Patents: 004
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
WO 9947200	A1	19990923	WO 99US6056	A	19990319	199947 B
US 6158432	A	20001212	US 95569919	A	19951208	200067
			US 9845461	A	19980320	
US 20020026941	A1	20020307	US 95569919	A	19951208	200221
			US 9845461	A	19980320	
			US 2000660820	A	20000913	
			US 2001931572	A	20010814	
US 6584973	B1	20030701	US 95569919	A	19951208	200345
			US 9845461	A	19980320	
			US 2000660820	A	20000913	

Priority Applications (No Type Date): US 9845461 A 19980320; US 95569919 A 19951208; US 2000660820 A 20000913; US 2001931572 A 20010814
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 9947200	A1	E	55	A61M-016/00	
Designated States (National): IL					
Designated States (Regional): AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE					
US 6158432	A			A61M-016/00	CIP of application US 95569919 CIP of patent US 5931160
US 20020026941	A1			A62B-007/00	CIP of application US 95569919 Cont of application US 9845461 Cont of application US 2000660820 CIP of patent US 5931160 Cont of patent US 6158432
US 6584973	B1			A61M-016/00	CIP of application US 95569919 Cont of application US 9845461 CIP of patent US 5931160 Cont of patent US 6158432

Compensating gas flow resistance in ventilation **apparatus for controlling** ventilator **pneumatic system**
Inventor: **BIONDI J W** ...

Abstract (Basic):
... peak exhalation flow rate an airway resistance. An effective airway pressure is calculated and a **negative** airway **pressure** is applied to an exhalation circuit such that the effective circuit pressure is greater than zero and less than **positive** end-expiratory **pressure** (**PEEP**).
... alarm and mandatory patient support upon detection of apnea (i.e., the detected absence of **breathing**), During operation, both systems perform background tests to detect system faults. INDEPENDENT CLAIMS are included for: a **ventilator** assist device controlling processor and user interface...

...For controlling a **ventilator** pneumatic system...

...Reduces patient work of **breathing** without compromising patient **ventilation** requirements...

... **ventilator** control system (10
...Title Terms: **VENTILATION** ;
International Patent Class (Main): **A61M-016/00** ...
... **A62B-007/00**

6/3,K/29 **(Item 29 from file: 350)**
DIALOG(R)File 350:Derwent WPIX

012140348 **Image available**
WPI Acc No: 1998-557260/199847
XRPX Acc No: N98-434385
Implanted device for detection and treatment of syncope - in which pharmaceutical composition for treating syncope is infused into heart upon detection of physiological activity associated with onset of syncope
Patent Assignee: PHARMATARGET INC (PHAR-N)
Inventor: BENDITT D; BUSCEMI P J; **LURIE K G** ; OBINO S F
Number of Countries: 021 Number of Patents: 003
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 9844986	A1	19981015	WO 98US7364	A	19980408	199847	B
US 5919210	A	19990706	US 97831608	A	19970410	199933	
US 6078834	A	20000620	US 97831608	A	19970410	200035	
			US 99257566	A	19990225		

Priority Applications (No Type Date): US 97831608 A 19970410; US 99257566 A 19990225
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 9844986	A1	E	28	A61N-001/368	
Designated States (National): CA JP					
Designated States (Regional): AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE					
US 5919210	A			A61M-005/142	
US 6078834	A			A61M-005/142	Cont of application US 97831608 Cont of patent US 5919210

...Inventor: **LURIE K G**
International Patent Class (Main): **A61M-005/142** ...

6/3,K/30 **(Item 30 from file: 350)**
DIALOG(R)File 350:Derwent WPIX

011799163 **Image available**
WPI Acc No: 1998-216073/199819
XRPX Acc No: N98-170832
Heart failure mask for increasing negative **intrathoracic** pressures - **has mask placed on patients face and includes one-way expiration valve with inspiratory threshold valve**
Patent Assignee: CPRX INC (CPRX-N)
Inventor: **LURIE K G**
Number of Countries: 079 Number of Patents: 004
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 5730122	A	19980324	US 96747371	A	19961112	199819	B
WO 9820938	A1	19980522	WO 97US20378	A	19971112	199826	
AU 9851734	A	19980603	AU 9851734	A	19971112	199842	
EP 949941	A1	19991020	EP 97946595	A	19971112	199948	
			WO 97US20378	A	19971112		

Priority Applications (No Type Date): US 96747371 A 19961112

Patent Details:
Patent No Kind Lan Pg Main IPC Filing Notes
US 5730122 A 8 A62B-018/10
WO 9820938 A1 E A62B-018/10
Designated States (National): AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GE GH HU ID IL IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG UZ VN YU ZW
Designated States (Regional): AT BE CH DE DK EA ES FI FR GB GH GR IE IT KE LS LU MC MW NL OA PT SD SE SZ UG ZW
AU 9851734 A A62B-018/10 Based on patent WO 9820938
EP 949941 A1 E A62B-018/10 Based on patent WO 9820938
Designated States (Regional): DE FR GB
Heart failure mask for increasing negative **intrathoracic** pressures -
Inventor: **LURIE K G**

...Abstract (Basic): range from about -3 cm H2O to about -25 cm H2O. The patient is kept **breathing** while the mask is sealed to the face...

... **Respiratory** gases are substantially completely prevented from entering the patient's lungs during inhalation until such...

...3 cm H2O to about -25 cm H2O, whereupon the inspiratory valve opens to allow **respiratory** gases into the lungs
International Patent Class (Main): **A62B-018/10**
International Patent Class (Additional): **A62B-018/02**

6/3,K/31 (Item 31 from file: 350)
DIALOG(R)File 350:Derwent WPIX

011761462 **Image available**
WPI Acc No: 1998-178372/199816
Related WPI Acc No: 1995-223538; 1996-401428; 2000-012719; 2000-104863; 2001-513528; 2002-267747; 2003-066281
XRPX Acc No: N98-141189
Catheter for coronary sinus of heart - has two sections each curved with respective arcs such that sum of arcs is between about 75 to about 100 degrees
Patent Assignee: DAIG CORP (DAIG-N)
Inventor: BENDITT D G; FLEISCHHACKER J J; **LURIE K G** ; OCKULY J D; SHULTZ J J
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 5722963	A	19980303	US 93106383	A	19930813	199816 B
			US 95371849	A	19950112	
			US 96625908	A	19960401	

Priority Applications (No Type Date): US 93106383 A 19930813; US 95371849 A 19950112; US 96625908 A 19960401
Patent Details:
Patent No Kind Lan Pg Main IPC Filing Notes
US 5722963 A 8 A61M-025/00 Cont of application US 93106383
Cont of application US 95371849
Cont of patent US 5423772
Cont of patent US 5549581

...Inventor: **LURIE K G**
International Patent Class (Main): **A61M-025/00**

6/3,K/32 (Item 32 from file: 350)
DIALOG(R)File 350:Derwent WPIX

011591259
WPI Acc No: 1998-008388/199801
XRAM Acc No: C98-002868

Use of vasopressin in medicaments to treat cardiac arrest - in conjunction with adrenergic and/or bradycardic agent(s), for administration to patients undergoing cardio-pulmonary resuscitation

Patent Assignee: LINDNER K (LIND-I); LURIE K G (LURI-I)
Inventor: LINDNER K; **LURIE K G**
Number of Countries: 022 Number of Patents: 010
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 9736609	A2	19971009	WO 97US5056	A	19970327	199801	B
AU 9725527	A	19971022	AU 9725527	A	19970327	199808	
US 5827893	A	19981027	US 96625733	A	19960329	199850	
EP 904097	A2	19990331	EP 97917089	A	19970327	199917	
			WO 97US5056	A	19970327		
AU 718520	B	20000413	AU 9725527	A	19970327	200028	
JP 2000507954	W	20000627	JP 97535438	A	19970327	200036	
			WO 97US5056	A	19970327		
CA 2250420	C	20021217	CA 2250420	A	19970327	200309	
			WO 97US5056	A	19970327		
EP 904097	B1	20030528	EP 97917089	A	19970327	200336	
			WO 97US5056	A	19970327		
DE 69722401	E	20030703	DE 622401	A	19970327	200351	
			EP 97917089	A	19970327		
			WO 97US5056	A	19970327		
ES 2200171	T3	20040301	EP 97917089	A	19970327	200426	

Priority Applications (No Type Date): US 96625733 A 19960329
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 9736609	A2	E	36	A61K-038/11	
Designated States (National): AU CA JP					
Designated States (Regional): AT BE CH DE DK ES FI FR GB GR IE IT LU MC NL PT SE					
AU 9725527	A			A61K-038/11	Based on patent WO 9736609
US 5827893	A			A61K-025/00	
EP 904097	A2	E		A61K-038/11	Based on patent WO 9736609
Designated States (Regional): AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE					
AU 718520	B			A61K-038/11	Previous Publ. patent AU 9725527 Based on patent WO 9736609
JP 2000507954	W		35	A61K-038/11	Based on patent WO 9736609
CA 2250420	C	E		A61K-038/11	Based on patent WO 9736609
EP 904097	B1	E		A61K-038/11	Based on patent WO 9736609
Designated States (Regional): AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE					
DE 69722401	E			A61K-038/11	Based on patent EP 904097 Based on patent WO 9736609
ES 2200171	T3			A61K-038/11	Based on patent EP 904097

... **conjunction with adrenergic and/or bradycardic agent(s), for administration to patients** undergoing cardio-pulmonary resuscitation
...Inventor: **LURIE K G**

...Abstract (Basic): in conjunction with one or more adrenergic agents; when administered to a patient undergoing cardiopulmonary **resuscitation** ; are new. Also claimed are: (a) a kit for the treatment of cardiac arrest comprising...

...instructions indicating that the active agents are to be administered to a patient undergoing cardiopulmonary **resuscitation** .

...

...The kits are useful in treatment of cardiac arrest when administered to patients undergoing cardiopulmonary **resuscitation** .

...Title Terms: **RESUSCITATION**

6/3,K/33 (Item 33 from file: 350)

DIALOG(R)File 350:Derwent WPIX

011035578 **Image available**
WPI Acc No: 1997-013502/199702
Related WPI Acc No: 1995-223538; 1996-401428; 1998-178372; 2000-012719; 2000-104863
XRPX Acc No: N97-011775

Catheter for use in the coronary sinus - has main reinforced portion, intermediate zone portion and tip portion, where portion of the catheter is curved in compound curve formed by first and second curve

Patent Assignee: DAIG CORP (DAIG-N); UNIV MINNESOTA (MINU)
Inventor: BENDITT D G; FLEISCHHACKER J J; 1LURIE K G ; OCKULY J D; SHULTZ J J
Number of Countries: 013 Number of Patents: 008
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
EP 745406	A2	19961204	EP 96102200	A	19960214	199702	B
JP 8322939	A	19961210	JP 9685364	A	19960408	199708	
CA 2166260	A	19961202	CA 2166260	A	19951228	199714	
EP 745406	A3	19970205	EP 96102200	A	19960214	199715	
US 5643231	A	19970701	US 93106383	A	19930813	199732	
			US 95371849	A	19950112		
			US 95457675	A	19950601		
CA 2166260	C	19990504	CA 2166260	A	19951228	199936	
EP 745406	B1	20030813	EP 96102200	A	19960214	200355	
DE 69629418	E	20030918	DE 629418	A	19960214	200369	
			EP 96102200	A	19960214		

Priority Applications (No Type Date): US 95457675 A 19950601; US 93106383 A 19930813; US 95371849 A 19950112
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
EP 745406	A2	E	9	A61M-025/00	
Designated States (Regional): AT CH DE ES FR GB IT LI NL SE					
JP 8322939	A		7	A61M-025/00	
CA 2166260	A			A61M-025/00	
EP 745406	A3			A61M-025/00	
US 5643231	A		8	A61M-025/00	CIP of application US 93106383
					CIP of application US 95371849
					CIP of patent US 5423772
					CIP of patent US 5549581
CA 2166260	C	E		A61M-025/00	
EP 745406	B1	E		A61M-025/00	
Designated States (Regional): AT CH DE ES FR GB IT LI NL SE					

DE 69629418 E A61M-025/00 Based on patent EP 745406
...Inventor: **LURIE K G**
International Patent Class (Main): **A61M-025/00**
International Patent Class (Additional): **A61M-025/01 ...**

6/3,K/34 (Item 34 from file: 350)
DIALOG(R)File 350:Derwent WPIX

010936621 **Image available**
WPI Acc No: 1996-433571/199643
Related WPI Acc No: 1995-193914; 2000-421466; 2002-139260; 2002-641994; 2002-681034; 2003-030322; 2003-310772; 2003-371349; 2003-766762
XRPX Acc No: N96-365340
Cardio-pulmonary resuscitation **device - has airflow impeding structure in form of restrictive orifice or pressure responsive valve placed within or in series with mask or** breathing **tube**
Patent Assignee: CPRX CORP (CPRX-N); CPRX LLC (CPRX-N); CPRX INC (CPRX-N); GOLD B (GOLD-I); LURIE K G (LURI-I); SWEENEY M (SWEE-I)
Inventor: GOLD B; **LURIE K G** ; SWEENEY M
Number of Countries: 070 Number of Patents: 007
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 9628215	A1	19960919	WO 96US2097	A	19960216	199643	B
AU 9649257	A	19961002	AU 9649257	A	19960216	199703	
US 5692498	A	19971202	US 93149204	A	19931109	199803	
			US 95403009	A	19950310		
EP 898485	A1	19990303	EP 96905523	A	19960216	199913	
			WO 96US2097	A	19960216		
CN 1183731	A	19980603	CN 96193712	A	19960216	200242	
EP 898485	B1	20030502	EP 96905523	A	19960216	200330	
			WO 96US2097	A	19960216		
DE 69627898	E	20030605	DE 627898	A	19960216	200345	
			EP 96905523	A	19960216		
			WO 96US2097	A	19960216		

Priority Applications (No Type Date): US 95403009 A 19950310; US 93149204 A 19931109
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 9628215	A1	E	48	A62B-007/00	
Designated States (National): AL AM AT AU AZ BB BG BR BY CA CH CN CZ DE DK EE ES FI GB GE HU IS JP KE KG KP KR KZ LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK TJ TM TR TT UA UG US UZ VN					
Designated States (Regional): AT BE CH DE DK EA ES FR GB GR IE IT KE LS LU MC MW NL OA PT SD SE SZ UG					
AU 9649257	A				Based on patent WO 9628215
US 5692498	A		23	A62B-009/02	CIP of application US 93149204
					CIP of patent US 5551420
EP 898485	A1	E		A62B-007/00	Based on patent WO 9628215
Designated States (Regional): DE FR GB IT SE					
CN 1183731	A			A62B-007/00	
EP 898485	B1	E		A62B-007/00	Based on patent WO 9628215
Designated States (Regional): DE FR GB IT SE					
DE 69627898	E			A62B-007/00	Based on patent EP 898485
					Based on patent WO 9628215

Cardio-pulmonary resuscitation **device...**

...of restrictive orifice or pressure responsive valve placed within or in

series with mask or breathing **tube**
...Inventor: **LURIE K G**

...Abstract (Basic): The cardio-pulmonary **resuscitation** device has an airflow impeding structure in the form of a restrictive orifice or a pressure responsive valve (24) placed within or in series with a mask or **breathing** tube (36...

...ADVANTAGE - Enhances extent and duration of **negative** intra-thoracic **pressure** during decompression of the patient's chest to enhance venous blood flow into the heart and lungs from the peripheral venous vasculature when performing cardio-pulmonary **resuscitation** .

...Abstract (Equivalent): The cardio-pulmonary **resuscitation** device has an airflow impeding structure in the form of a restrictive orifice or a pressure responsive valve (24) placed within or in series with a mask or **breathing** tube (36...

...ADVANTAGE - Enhances extent and duration of **negative** intra-thoracic **pressure** during decompression of the patient's chest to enhance venous blood flow into the heart and lungs from the peripheral venous vasculature when performing cardio-pulmonary **resuscitation** .

...Title Terms: **RESUSCITATION** ;
International Patent Class (Main): **A62B-007/00** ...

... **A62B-009/02**
International Patent Class (Additional): **A61M-016/04** ...

... **A61M-016/20**

6/3,K/35 (Item 35 from file: 350)
DIALOG(R)File 350:Derwent WPIX

010904477 **Image available**
WPI Acc No: 1996-401428/199640
Related WPI Acc No: 1995-223538; 1998-178372; 2000-012719; 2000-104863; 2001-513528; 2002-267747; 2003-066281
XRPX Acc No: N96-338248
Catheter for insertion in ostium of coronary sinus in right atrium - has main reinforcing portion, intermediate zone portion and soft tip portion, with portion of catheter is curved in double curve, with first and second curve being longitudinal curves
Patent Assignee: DAIG CORP (DAIG-N)
Inventor: BENDITT D G; FLEISCHHACKER J J; **LURIE K G** ; OCKULY J D; SHULTZ J J
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 5549581	A	19960827	US 93106383	A	19930813	199640	B
			US 95371849	A	19950112		

Priority Applications (No Type Date): US 93106383 A 19930813; US 95371849 A 19950112
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 5549581	A		8	A61M-025/00	Cont of application US 93106383
					Cont of patent US 5423772

...Inventor: **LURIE K G**
International Patent Class (Main): **A61M-025/00**

6/3,K/36 (Item 36 from file: 350)
DIALOG(R)File 350:Derwent WPIX

010789985 **Image available**
WPI Acc No: 1996-286938/199629
XRPX Acc No: N96-240896

Pneumatic system for ventilator **to control inspired and expired gas flow during** respiratory **therapy - has pneumatic system including circuit for controlling supply of one or more selected gases to patient** breathing **circuit**

Patent Assignee: CARDIOPULMONARY CORP (CARD-N)
Inventor: **BIONDI J W** ; JOHNSTON D M; SCHROEDER G
Number of Countries: 023 Number of Patents: 009
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 9617641	A1	19960613	WO 95US15706	A	19951204	199629	B
AU 9646391	A	19960626	AU 9646391	A	19951204	199641	
US 5664563	A	19970909	US 94352658	A	19941209	199742	
EP 796119	A1	19970924	EP 95944311	A	19951204	199743	
			WO 95US15706	A	19951204		
AU 689371	B	19980326	AU 9646391	A	19951204	199826	
JP 10510182	W	19981006	WO 95US15706	A	19951204	199850	
			JP 96517683	A	19951204		
EP 796119	B1	19991027	EP 95944311	A	19951204	199950	
			WO 95US15706	A	19951204		
DE 69513042	E	19991202	DE 613042	A	19951204	200003	
			EP 95944311	A	19951204		
			WO 95US15706	A	19951204		
IL 116236	A	20000716	IL 116236	A	19951203	200049	

Priority Applications (No Type Date): US 94352658 A 19941209
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 9617641	A1	E	25	A61M-016/00	
Designated States (National): AU CA JP KR NZ					
Designated States (Regional): AT BE CH DE DK ES FR GB GR IE IT LU MC NL PT SE					
AU 9646391	A			A61M-016/00	Based on patent WO 9617641
US 5664563	A		14	A61M-016/00	
EP 796119	A1	E		A61M-016/00	Based on patent WO 9617641
Designated States (Regional): DE FR GB SE					
AU 689371	B			A61M-016/00	Previous Publ. patent AU 9646391 Based on patent WO 9617641
JP 10510182	W		33	A61M-016/12	Based on patent WO 9617641
EP 796119	B1	E		A61M-016/00	Based on patent WO 9617641
Designated States (Regional): DE FR GB SE					
DE 69513042	E			A61M-016/00	Based on patent EP 796119 Based on patent WO 9617641
IL 116236	A			A61M-016/00	

Pneumatic system for ventilator **to control inspired and expired gas flow during** respiratory **therapy**...

...**pneumatic system including circuit for controlling supply of one or more selected gases to patient** breathing **circuit**
Inventor: **BIONDI J W** ...

...Abstract (Basic): A patient **breathing** circuit includes a first port for introducing the gas into the patient **breathing** circuit with a humidifier downstream from the inlet for humidifying the gas, and a flexible...

...a heating device for heating the sterilisation chamber, and is located upstream from the patient **breathing** circuit...

...ADVANTAGE - Allows a patient to spontaneously **breathe** from the bag reservoir at any time and allows the pneumatic circuit to deliver a control **breath** through the bag by pressurizing the canister that the bag resides in. The patient **breathing** circuit provides significant advantages when compared to other **ventilator** circuits namely, ease of spontaneously rebreathing. Therefor the external gas mixing is allowed as well...

...Abstract (Equivalent): A pneumatic system for a **ventilator** in fluid communication with a source of gas comprising...

...a patient **breathing** circuit including a first port for introducing said gas into said patient **breathing** circuit, a humidifier downstream from said source of gas for humidifying said gas, a flexible...

...Title Terms: **VENTILATION** ;

International Patent Class (Main): **A61M-016/00** ...

... **A61M-016/12**

6/3,K/37 (Item 37 from file: 350)

DIALOG(R)File 350:Derwent WPIX

010322265 **Image available**

WPI Acc No: 1995-223538/199529

Related WPI Acc No: 1996-401428; 1998-178372; 2000-012719; 2000-104863; 2001-513528; 2002-267747; 2003-066281

XRPX Acc No: N95-175252

Catheter for use in coronary sinks - has intermediate zone portion and pliable tip, with first and second curved portions

Patent Assignee: DAIG CORP (DAIG-N)

Inventor: BENDITT D G; FLEISCHHACKER J J; **LURIE K G** ; OCKULY J D; SHULTZ J J

Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 5423772	A	19950613	US 93106383	A	19930813	199529	B

Priority Applications (No Type Date): US 93106383 A 19930813

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 5423772	A		6	A61M-025/00	

...Inventor: **LURIE K G**

International Patent Class (Main): **A61M-025/00**

6/3,K/38 (Item 38 from file: 350)

DIALOG(R)File 350:Derwent WPIX

010292655 **Image available**

WPI Acc No: 1995-193914/199525
Related WPI Acc No: 1996-433571; 2000-421466; 2002-139260; 2002-641994; 2002-681034; 2003-030322; 2003-310772; 2003-371349; 2003-766762
XRPX Acc No: N95-152234

Method for increasing cardiopulmonary circulation - involves impeding airflow into patient's lungs by placing ventilation **tube in patient's airway**

Patent Assignee: CPRX INC (CPRX-N); CPRX LLC (CPRX-N); GOLD B (GOLD-I); LURIE K G (LURI-I); SWEENEY M (SWEE-I)
Inventor: GOLD B; **LURIE K G** ; SWEENEY M
Number of Countries: 060 Number of Patents: 010
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 9513108	A1	19950518	WO 94US12870	A	19941107	199525	B
AU 9510918	A	19950529	AU 9510918	A	19941107	199537	
EP 728028	A1	19960828	WO 94US12870	A	19941107	199639	
			EP 95901822	A	19941107		
US 5551420	A	19960903	US 93149204	A	19931109	199641	
EP 728028	A4	19970604	EP 95901822	A		199746	
JP 9508811	W	19970909	WO 94US12870	A	19941107	199746	
			JP 95513953	A	19941107		
AU 687942	B	19980305	AU 9510918	A	19941107	199820	
EP 728028	B1	20030521	WO 94US12870	A	19941107	200341	
			EP 95901822	A	19941107		
DE 69432708	E	20030626	DE 632708	A	19941107	200350	
			WO 94US12870	A	19941107		
			EP 95901822	A	19941107		
ES 2199976	T3	20040301	EP 95901822	A	19941107	200426	

Priority Applications (No Type Date): US 93149204 A 19931109
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 9513108	A1		31	A61M-015/00	
Designated States (National): AM AT AU BB BG BR BY CA CH CN CZ DE DK EE ES FI GB GE HU JP KE KG KP KR KZ LK LR LT LU LV MD MG MN MW NL NO NZ PL PT RO RU SD SE SI SK TJ TT UA UZ VN					
Designated States (Regional): AT BE CH DE DK ES FR GB GR IE IT KE LU MC MW NL OA PT SD SE SZ					
AU 9510918	A				Based on patent WO 9513108
EP 728028	A1	E	31	A61M-015/00	Based on patent WO 9513108
Designated States (Regional): AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE					
US 5551420	A		13	A62B-009/02	
JP 9508811	W		31	A61M-016/00	Based on patent WO 9513108
AU 687942	B				Previous Publ. patent AU 9510918
					Based on patent WO 9513108
EP 728028	B1	E		A61M-015/00	Based on patent WO 9513108
Designated States (Regional): AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE					
DE 69432708	E			A61M-015/00	Based on patent EP 728028
					Based on patent WO 9513108
ES 2199976	T3			A61M-015/00	Based on patent EP 728028

... **involves impeding airflow into patient's lungs by placing** ventilation **tube in patient's airway**

...Inventor: **LURIE K G**

...Abstract (Basic): impeding air flow into the patient's lungs to enhance the extent and duration of **negative** intrathoracic **pressure** during decompression of the patient's chest...

...USE - For increasing cardiopulmonary circulation when performing

cardiopulmonary **resuscitation** .

...Abstract (Equivalent): method for increasing cardiopulmonary circulation induced by chest compression and decompression when performing cardio pulmonary **resuscitation** , by augmenting at least the **negative** intrathoracic **pressure** , said method comprising the steps of...

...providing a **ventilatory** tube having a length which extends at least between a patient's mouth and throat, a source of **respiratory** gases, and at least one inflow valve...

...compression and chest decompression, wherein during chest decompression, said at least one inflow valve prevents **respiratory** gases from entering the lungs until a **negative** intrathoracic **pressure** level is exceeded at which time said at least one inflow valve opens, said at least one inflow valve assisting in increasing the magnitude and duration of **negative** intrathoracic **pressure** during decompression and thereby enhancing the amount of venous blood flow into the heart and...

...periodically, every 2-10 chest compressions, supplying the patient with gas from the **respiratory** gas source so as to properly **ventilate** the patient...
...Title Terms: **VENTILATION** ;
International Patent Class (Main): **A61M-015/00** ...

... **A61M-016/00** ...

... **A62B-009/02**
...International Patent Class (Additional): **A62B-007/00** ...

... **A62B-009/06** ...

... **A62B-018/02**

6/3,K/39 (Item 39 from file: 350)
DIALOG(R)File 350:Derwent WPIX

010149536 **Image available**
WPI Acc No: 1995-050788/199507
XRPX Acc No: N95-039918
Circulatory and respiratory **assistance method - reducing intra-thoracic pressure in patient by extracting, under sub-ambient** respiratory **gas pressure portion of** respiratory **gas volume from lungs beginning during diastolic period of same cardiac cycle**
Patent Assignee: CARDIOPULMONARY CORP (CARD-N)
Inventor: **BIONDI J W** ; HERMAN S J; JOHNSTON D M
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 5377671	A	19950103	US 91692153	A	19910426	199507	B
			US 91760409	A	19910916		

Priority Applications (No Type Date): US 91760409 A 19910916; US 91692153 A 19910426
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 5377671	A		10	A61H-031/00	CIP of application US 91692153

Circulatory and respiratory **assistance method...**

...**reducing intra-thoracic pressure in patient by extracting, under sub-ambient** respiratory **gas pressure portion of** respiratory **gas volume from lungs beginning during diastolic period of same cardiac cycle**
Inventor: **BIONDI J W** ...

...Abstract (Basic): The method of providing circulatory and **respiratory** assistance in a patient having a cardiac cycle including a ventricular systolic portion and a ventricular diastolic portion, involves beginning the introduction of the **respiratory** gas upon the start of an inhalation by the patient, determining the onset and duration...

...increasing the intra-thoracic pressure of the patient by introducing a volume of a **respiratory** gas into the lungs of the patient during the ventricular systolic portion of the cardiac...

...intra-thoracic pressure of the patient is reduced by beginning extracting the volume of the **respiratory** gas from the lungs of the patient during the diastolic portion of the same cardiac...

...USE/ADVANTAGE - Providing circulatory and **respiratory** assistance. Provides improved cardiac output while employing normal physiological **breath** rate and tidal volume...
...Title Terms: **RESPIRATION** ;

6/3,K/40 (Item 40 from file: 350)
DIALOG(R)File 350:Derwent WPIX
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010075354 **Image available**
WPI Acc No: 1994-343067/199443
Related WPI Acc No: 1992-351402
XRPX Acc No: N94-269211
Cardiopulmonary resuscitation **device - has vacuum cup with connecting stem attached with handle having pair of spaced-apart gripping surfaces**
Patent Assignee: UNIV CALIFORNIA (REGC); AMBU INT AS (AMBU-N)
Inventor: COHEN T J; KOHNKE O B; **LURIE K G**
Number of Countries: 022 Number of Patents: 011
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
EP 623334	A1	19941109	EP 94106492	A	19940426	199443	B
AU 9460539	A	19941110	AU 9460539	A	19940418	199445	
CA 2117275	A	19941105	CA 2117275	A	19940414	199505	
BR 9401638	A	19941220	BR 941638	A	19940428	199507	
US 5645522	A	19970708	US 91686542	A	19910417	199733	
			US 9358195	A	19930504		
AU 687379	B	19980226	AU 9460539	A	19940418	199821	
EP 623334	B1	19990609				199927	
DE 69418937	E	19990715	DE 618937	A	19940426	199934	
			EP 94106492	A	19940426		
ES 2132274	T3	19990816	EP 94106492	A	19940426	199939	
JP 3072318	B2	20000731	JP 9494478	A	19940506	200041	
CA 2117275	C	20011216	CA 2117275	A	19940414	200163	

Priority Applications (No Type Date): US 9358195 A 19930504; US 91686542 A 19910417
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes

EP 623334 A1 E 19 A61H-031/00
Designated States (Regional): AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE
AU 9460539 A A61H-031/00
BR 9401638 A A61B-019/00
US 5645522 A 17 CIP of application US 91686542
AU 687379 B A61H-031/00 Previous Publ. patent AU 9460539
EP 623334 B1 E
Designated States (Regional): AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE
DE 69418937 E Based on patent EP 623334
ES 2132274 T3 Based on patent EP 623334
JP 3072318 B2 14 A61H-031/00 Previous Publ. patent JP 6343701
CA 2117275 C E A61H-031/00
Cardiopulmonary resuscitation **device**...
...Inventor: **LURIE K G**

...Abstract (Basic): ADVANTAGE - Provides an alternatively compressing and expanding of patient's chest to induce both **ventilation** and blood circulation...
...Abstract (Equivalent): A device for performing cardiopulmonary **resuscitation** of a patient, said device comprising...
Title Terms: **RESUSCITATION** ;

6/3,K/41 (Item 41 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2004 Thomson Derwent. All rts. reserv.

009915468 **Image available**
WPI Acc No: 1994-183178/199422
XRAM Acc No: C94-082996
XRPX Acc No: N94-144660
Method for enhanced cardiopulmonary resuscitation **- useful in patients suffering from cardiac arrest**
Patent Assignee: UNIV MINNESOTA (MINU)
Inventor: GOLD B S; **LURIE K G**
Number of Countries: 021 Number of Patents: 003
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 9411045	A1	19940526	WO 93US11034	A	19931115	199422	B
AU 9456064	A	19940608	AU 9456064	A	19931115	199435	
US 5588422	A	19961231	US 92977498	A	19921117	199707	

Priority Applications (No Type Date): US 92977498 A 19921117
Patent Details:
Patent No Kind Lan Pg Main IPC Filing Notes
WO 9411045 A1 E 25 A61M-015/00
Designated States (National): AU CA JP KR
Designated States (Regional): AT BE CH DE DK ES FR GB GR IE IT LU MC NL PT SE
AU 9456064 A A61M-015/00 Based on patent WO 9411045
US 5588422 A 7 A61M-015/00
Method for enhanced cardiopulmonary resuscitation -
...Inventor: **LURIE K G**

...Abstract (Basic): **Resuscitating** a patient suffering from cardiac arrest comprises actively inducing venous blood transport into the heart and arterial blood transport from the heart, **ventilating** the patient's lungs, admin. to the patient concurrently with the inducing

and **ventilating** steps of an amt. of an arterial constrictor sufficient to increase the patient arterial blood pressure, and admin. to the patient concurrently with the inducing and **ventilating** steps of an amt. of a venodilator sufficient to enhance arterial blood flow to the...

...USE/ADVANTAGE - The method and compsns. are useful for **resuscitating** patients suffering from cardiac arrest. The method enhances patient survival and reduces heart and brain
...Abstract (Equivalent): A method for **resuscitating** a patient suffering from cardiac arrest, said method comprising...
...b) **ventilating** the patient's lungs...

...c) administering to the patient concurrently with said inducing and **ventilating** steps, a bolus of medicament comprising epinephrine and nitroglycerin in amounts of from 1 mg...
...Title Terms: **RESUSCITATION** ;
International Patent Class (Main): **A61M-015/00**

6/3,K/42 (Item 42 from file: 350)
DIALOG(R)File 350:Derwent WPIX

009223981 **Image available**
WPI Acc No: 1992-351402/199243
Related WPI Acc No: 1994-343067
XRPX Acc No: N92-267925
External chest compression for resuscitation **- using body with stiff upper surface which withstand force, lower soft surface which spreads on application of force and handle**
Patent Assignee: UNIV CALIFORNIA (REGC)
Inventor: COHEN T J; **LURIE K G**
Number of Countries: 019 Number of Patents: 009
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
EP 509773	A1	19921021	EP 92303367	A	19920415	199243	B
AU 9214877	A	19921022	AU 9214877	A	19920413	199250	
CA 2066297	A	19921018	CA 2066297	A	19920416	199302	
AU 651189	B	19940714	AU 9214877	A	19920413	199432	
US 5454779	A	19951003	US 91686542	A	19910417	199545	
			US 94226431	A	19940412		
EP 509773	B1	19980107	EP 92303367	A	19920415	199806	
DE 69223840	E	19980212	DE 623840	A	19920415	199812	
			EP 92303367	A	19920415		
ES 2112298	T3	19980401	EP 92303367	A	19920415	199819	
CA 2066297	C	20000905	CA 2066297	A	19920416	200053	

Priority Applications (No Type Date): US 91686542 A 19910417; US 94226431 A 19940412
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
EP 509773	A1	E	13	A61H-031/00	
Designated States (Regional): AT BE CH DE DK ES FR GB GR IT LI LU MC NL PT SE					
AU 9214877	A			A61H-031/00	
CA 2066297	A			A61H-031/00	
AU 651189	B			A61H-031/00	Previous Publ. patent AU 9214877
US 5454779	A		13	A61H-031/02	Cont of application US 91686542
EP 509773	B1	E	12	A61H-031/00	

Designated States (Regional): DE ES FR GB IT
DE 69223840 E A61H-031/00 Based on patent EP 509773
ES 2112298 T3 A61H-031/00 Based on patent EP 509773
CA 2066297 C E A61H-031/00

External chest compression for resuscitation -
...Inventor: **LURIE K G**

...Abstract (Basic): USE/ADVANTAGE - Cardiopulmonary **resuscitation** device. Actively expands halienty chest to improve **respiration** and blood flow...
...Abstract (Equivalent): USE/ADVANTAGE - Cardiopulmonary **resuscitation** device. Actively expands halienty chest to improve **respiration** and blood flow...
...Title Terms: **RESUSCITATION** ;

6/3,K/43 (Item 43 from file: 350)
DIALOG(R)File 350:Derwent WPIX

008044251 **Image available**
WPI Acc No: 1989-309363/198942
XRPX Acc No: N89-235729
Computerised control system for cardiocirculatory assistance - detects particular phase of cardiac cycle and controls increase in intrathoracic pressure in relative phase with this event
Patent Assignee: CARDIOPULMONARY CORP (CARD-N); CARDIOPULMONARY COR (CARD-N)
Inventor: **BIONDI J W** ; MENTELOS R A
Number of Countries: 018 Number of Patents: 012
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 8909041	A	19891005	WO 89US1356	A	19890331	198942	B
AU 8935477	A	19891016				199008	
EP 407463	A	19910116	EP 89905326	A	19890331	199103	
FI 9004784	A	19900928				199105	
DK 9002354	A	19900928				199106	
JP 2504596	W	19901227	JP 89504999	A	19890331	199107	
NO 9004250	A	19901128				199108	
US 5020516	A	19910604	US 88175810	A	19880331	199125	
AU 9215167	A	19920625	AU 9215167	A	19920427	199233	
			AU 8935477	A			
EP 407463	A4	19910605	EP 89905326	A		199516	
FI 103376	B1	19990630	WO 89US1356	A	19890331	199932	
			FI 904784	A	19900928		
DK 173598	B	20010423	WO 89US1356	A	19890331	200131	
			DK 902354	A	19900928		

Priority Applications (No Type Date): US 88175810 A 19880331
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 8909041	A	E	27		
Designated States (National): AU DK FI JP KR NO					
Designated States (Regional): AT BE CH DE FR GB IT LU NL SE					
EP 407463	A				
Designated States (Regional): AT BE CH DE FR GB IT LI LU NL SE					
AU 9215167	A			A61H-031/00	Div ex application AU 8935477
FI 103376	B1			A61H-031/00	Previous Publ. patent FI 9004784
DK 173598	B			A61H-031/00	Previous Publ. patent DK 9002354

Inventor: **BIONDI J W ...**

...Abstract (Basic): system (10) to the patient. The patient interface may include equipment for supplying high frequency **respiration** pulses in synchronising with the cardiac cycle, for example, by inflating a bladder in contact...

...Abstract (Equivalent): N is a positive integer. The patient interface may include apparatus for supplying high frequency **respiration** pulses in synchronism with the cardiac cycle. Alternately, or in addition, the pulses may be...

International Patent Class (Additional): **A61M-016/00**

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Set     Items   Description
S1         47   AU=(LURIE K? OR LURIE, K? OR MENK V? OR MENK, V? OR ZIELIN-
             SKI T? OR ZIELINSKI, T? OR BIONDI J? OR BIONDI, J?)
S2          0   KEITH(2W)LURIE OR VERN(2W)MENK OR TODD(2W)ZIELINSKI OR JAM-
             ES(2W)BIONDI
S3     115081   RESUSC? OR RESPIRAT? OR BREATH? OR VENTILAT? OR CPR OR PEEP
              OR (POSITIVE OR NEGATIVE)(2N)PRESSUR?
S4      39663   IC=(A62B? OR A61G? OR A61M?)
S5         39   S1:S2 AND S3:S4
S6         39   IDPAT (sorted in duplicate/non-duplicate order)
? show files
File 348:EUROPEAN PATENTS 1978-2004/May W01
         (c) 2004 European Patent Office
File 349:PCT FULLTEXT 1979-2002/UB=20040506,UT=20040429
         (c) 2004 WIPO/Univentio
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6/3,AU/1 (Item 1 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01588505
FACE MASK VENTILATION **/PERFUSION SYSTEMS AND METHOD**
SYSTEMES DE VENTILATION **/PERFUSION A MASQUE FACIAL ET PROCEDE ASSOCIE**
PATENT ASSIGNEE:
CPRX LLC, (3001041), 4330 Upton Avenue South, Minneapolis, MN 55410, (US)
, (Applicant designated States: all)
INVENTOR:
LURIE, Keith, G. , 4751 Girard Avenue South, Minneapolis, MN 55409, (US)
ZIELINSKI, Todd, M. , 3549 43rd Ave. South, Minneapolis, MN 55406, (US)
HARDER, Scott, Edward, 4601 Emerson Avenue South, Minneapolis, MN 55409, (US)
GISCH, Teresa, Marie, 4605 Bower Path, Inver Grove Heights, MN 55076, (US)
WAFFENSMITH, Jeff, 4337 Beard Avenue North, Robinsdale, MN 55422, (US)
LEYDEN, Matt, V., 1024 Laurel Avenue, St. Paul, MN 55104, (US
PATENT (CC, No, Kind, Date): WO 2003028613 030410
APPLICATION (CC, No, Date): EP 2002768824 020905; WO 2002US28568 020905
PRIORITY (CC, No, Date): US 966945 010928
DESIGNATED STATES: AT; BE; BG; CH; CY; CZ; DE; DK; EE; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS: A61H-001/00
LANGUAGE (Publication,Procedural,Application): English; English; English

6/3,AU/2 (Item 2 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00999003
FACE MASK VENTILATION **/PERFUSION SYSTEMS AND METHOD**
SYSTEMES DE VENTILATION **/PERFUSION A MASQUE FACIAL ET PROCEDE ASSOCIE**
Patent Applicant/Assignee:
ADVANCED CIRCULATORY SYSTEMS INC, 7615 Golden Triangle Drive, Suite A, Technology Park #5, Eden Prairie, MN 55344, US, US (Residence), US (Nationality)
Inventor(s):
LURIE Keith G , 4751 Girard Avenue South, Minneapolis, MN 55409, US,
ZIELINSKI Todd M , 3549 43rd Ave. South, Minneapolis, MN 55406, US,
HARDER Scott Edward, 4601 Emerson Avenue South, Minneapolis, MN 55409, US
,
GISCH Teresa Marie, 4605 Bower Path, Inver Grove Heights, MN 55076, US,
WAFFENSMITH Jeff, 4337 Beard Avenue North, Robinsdale, MN 55422, US,
LEYDEN Matt V, 1024 Laurel Avenue, St. Paul, MN 55104, US
Legal Representative:
GIBBY Darin J (et al) (agent), Townsend and Townsend and Crew LLP, Two Embarcadero Center, Eighth Floor, San Francisco, CA 94111-3834, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200328613 A2-A3 20030410 (WO 0328613)
Application: WO 2002US28568 20020905 (PCT/WO US0228568)
Priority Application: US 2001966945 20010928
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG UZ VC VN YU ZA ZM ZW

(EP) AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LU MC NL PT SE SK TR
(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 8782

6/3,AU/3 (Item 3 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01587957
SYSTEMS AND METHODS TO FACILITATE THE DELIVERY OF DRUGS
SYSTEMES ET PROCEDES FACILITANT L'ADMINISTRATION DE MEDICAMENTS
PATENT ASSIGNEE:
CPRX LLC, (3001041), 4330 Upton Avenue South, Minneapolis, MN 55410, (US)
, (Applicant designated States: all)
INVENTOR:
LURIE, Keith, G. , 4751 Girard Avenue South, Minneapolis, MN 55409, (US)
VOELCKEL, Wolfgang, Krehbachgasse 13C, A-6410 Telfs, (AT
PATENT (CC, No, Kind, Date):
WO 2003028793 030410
APPLICATION (CC, No, Date): EP 2002756853 020730; WO 2002US24325 020730
PRIORITY (CC, No, Date): US 967029 010928
DESIGNATED STATES: AT; BE; BG; CH; CY; CZ; DE; DK; EE; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS: **A61M-016/00**
LANGUAGE (Publication,Procedural,Application): English; English; English

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6/3,AU/4 (Item 4 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00999082
SYSTEMS AND METHODS TO FACILITATE THE DELIVERY OF DRUGS
SYSTEMES ET PROCEDES FACILITANT L'ADMINISTRATION DE MEDICAMENTS
Patent Applicant/Assignee:
CPRX LLC, 4330 Upton Avenue South, Minneapolis, MN 55410, US, US
(Residence), US (Nationality)
Inventor(s):
LURIE Keith G , 4751 Girard Avenue South, Minneapolis, MN 55409, US,
VOELCKEL Wolfgang, Krehbachgasse 13C, A-6410 Telfs, AT
Legal Representative:
GIBBY Darin J (et al) (agent), Townsend and Townsend and Crew LLP, Two Embarcadero Center, Eighth Floor, San Francisco, CA 94111-3834, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200328793 A1 20030410 (WO 0328793)
Application: WO 2002US24325 20020730 (PCT/WO US0224325)
Priority Application: US 2001967029 20010928
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG UZ VN YU ZA ZM ZW
(EP) AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LU MC NL PT SE SK TR
(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW

(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 3408

6/3,AU/5 (Item 5 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
(c) 2004 European Patent Office. All rts. reserv.

01531563
SHOCK TREATMENT SYSTEMS AND METHODS
SYSTEM UND VERFAHREN ZUR SCHOCKBEHANDLUNG
SYSTEMES ET PROCEDES DE TRAITEMENT DE L'ETAT DE CHOC
PATENT ASSIGNEE:
Advanced Circulatory Systems, Inc., (4475370), 7615 Golden Triangel Drive, Suite A,, Eden Prairie, Minnesota 55344, (US), (Applicant designated States: all)
INVENTOR:
LURIE, Keith, G. , 4751 Girard Avenue South, Minneapolis, MN 55409, (US)
ZIELINSKI, Todd, M. , 3549 43rd Ave. South, Minneapolis, MN 55406, (US
LEGAL REPRESENTATIVE:
Evens, Paul Jonathan et al (83931), Maguire Boss, 5 Crown Street, St. Ives, Cambridge PE27 5EB, (GB)
PATENT (CC, No, Kind, Date): EP 1387714 A1 040211 (Basic)
WO 2002092169 021121
APPLICATION (CC, No, Date): EP 2002769675 020501; WO 2002US14039 020501
PRIORITY (CC, No, Date): US 854238 010511; US 119203 020408
DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE; TR
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS: **A62B-009/02** ; **A62B-007/04** ; **A61M-016/00** ; F16K-031/26
NOTE:
No A-document published by EPO
LANGUAGE (Publication,Procedural,Application): English; English; English

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6/3,AU/6 (Item 6 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
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00958376
SHOCK TREATMENT SYSTEMS AND METHODS
SYSTEMES ET PROCEDES DE TRAITEMENT DE L'ETAT DE CHOC
Patent Applicant/Assignee:
ADVANCED CIRCULATORY SYSTEMS INC, 7615 Golden Triangle Drive, Suite A, Technology Park #5, Eden Prairie, MN 55344, US, US (Residence), US (Nationality)
Inventor(s):
LURIE Keith G , 4751 Girard Avenue South, Minneapolis, MN 55409, US,
ZIELINSKI Todd M , 3549 43rd Ave. South, Minneapolis, MN 55406, US
Legal Representative:
GIBBY Darin J (et al) (agent), Townsend and Townsend and Crew LLP, Two Embarcadero Center, Eighth Floor, San Francisco, CA 94111-3834, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200292169 A1 20021121 (WO 0292169)
Application: WO 2002US14039 20020501 (PCT/WO US02014039)
Priority Application: US 2001854238 20010511; US 2002119203 20020408
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU

CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP
KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO
RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG UZ VN YU ZA ZM ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 25183

6/3,AU/7 (Item 7 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01530028
CARDIOPULMONARY RESUSCITATION **CHEST COMPRESSION/DECOMPRESSION DEVICE WITH ELECTRONIC STETHOSCOPE**
APPAREIL DE REANIMATION CARDIO-PULMONAIRE PAR COMPRESSION/DECOMPRESSION DU THORAX EQUIPE D'UN STETHOSCOPE ELECTRONIQUE ET DE BIOCAPTEURS
PATENT ASSIGNEE:
CPRX LLC, (3001041), 4330 Upton Avenue South, Minneapolis, MN 55410, (US), (Applicant designated States: all)
INVENTOR:
LURIE, Keith, G. , 4751 Girard Avenue South, Minneapolis, MN 55409, (US)
ZIELINSKI, Todd, M. , 3549 43rd Ave. South, Minneapolis, MN 55406, (US
PATENT (CC, No, Kind, Date): WO 2002091905 021121
APPLICATION (CC, No, Date): EP 2002725913 020501; WO 2002US14038 020501
PRIORITY (CC, No, Date): US 854404 010511
DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE; TR
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS: A61B-001/00
LANGUAGE (Publication,Procedural,Application): English; English; English

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6/3,AU/8 (Item 8 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00958230
CARDIOPULMONARY RESUSCITATION **CHEST COMPRESSION/DECOMPRESSION DEVICE WITH ELECTRONIC STETHOSCOPE**
APPAREIL DE REANIMATION CARDIO-PULMONAIRE PAR COMPRESSION/DECOMPRESSION DU THORAX EQUIPE D'UN STETHOSCOPE ELECTRONIQUE ET DE BIOCAPTEURS
Patent Applicant/Assignee:
ADVANCED CIRCULATORY SYSTEMS INC, 7615 Golden Triangle Drive, Suite A, Technology Park #5, Eden Prairie, MN 55344, US, US (Residence), US (Nationality)
Inventor(s):
LURIE Keith G , 4751 Girard Avenue South, Minneapolis, MN 55409, US,
ZIELINSKI Todd M , 3549 43rd Ave. South, Minneapolis, MN 55406, US
Legal Representative:
GIBBY Darin J (et al) (agent), Townsend and Townsend and Crew LLP, Two Embarcadero Center, Eighth Floor, San Francisco, CA 94111-3834, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200291905 A2-A3 20021121 (WO 0291905)
Application: WO 2002US14038 20020501 (PCT/WO US0214038)

Priority Application: US 2001854404 20010511
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG UZ VN YU ZA ZM ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 9294

6/3,AU/9 (Item 9 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01454168
VENTILATOR **CONTROL SYSTEM AND METHOD**
STEUERUNG EINES BEATMUNGSGERATES UND VERFAHREN
SYSTEME DE VENTILATEUR **PERMETTANT DE SEVRER AUTOMATIQUEMENT UN PATIENT DE SA** VENTILATION **MECANIQUE ET TECHNIQUE A CET EFFET**
PATENT ASSIGNEE:
CARDIOPULMONARY CORPORATION, (1156111), 200 Cascade Boulevard, Milford, CT 06460, (US), (Applicant designated States: all)
INVENTOR:
BIONDI, James, W. , 1601 Ridge Road, North Haven, CT 06473, (US)
LOCKHORN, Nancy, Apt. 1C, 275 Circular Avenue, Hamden, CT 06514, (US)
REYNOLDS, Robert, 299 Townsend Street, New Haven, CT 06512, (US
LEGAL REPRESENTATIVE:
McKechnie, Neil et al (81374), Kennedys Patent Agency Limited, Floor 5, Queens House, 29 St. Vincent Place, Glasgow G1 2DT, (GB)
PATENT (CC, No, Kind, Date): EP 1355690 A2 031029 (Basic)
WO 2002058619 020801
APPLICATION (CC, No, Date): EP 2002704199 020122; WO 2002US1716 020122
PRIORITY (CC, No, Date): US 767173 010122
DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE; TR
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS: **A61M-016/00**
NOTE:
No A-document published by EPO
LANGUAGE (Publication,Procedural,Application): English; English; English

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6/3,AU/10 (Item 10 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00926148
VENTILATOR **CONTROL SYSTEM AND METHOD**
SYSTEME DE VENTILATEUR **PERMETTANT DE SEVRER AUTOMATIQUEMENT UN PATIENT DE SA** VENTILATION **MECANIQUE ET TECHNIQUE A CET EFFET**
Patent Applicant/Assignee:
CARDIOPULMONARY CORPORATION, 200 Cascade Boulevard, Milford, CT 06460, US , US (Residence), US (Nationality)
Inventor(s):
BIONDI James W , 1601 Ridge Road, North Haven, CT 06473, US,
LOCKHORN Nancy, Apartment 1C, 275 Circular Avenue, Hamden, CT 06514, US,

REYNOLDS Robert, 299 Townsend Street, New Haven, CT 06512, US
Legal Representative:
MOORE Ronda P (agent), Testa, Hurwitz & Thibeault, LLP, High Street Tower, 125 High Street, Boston, MA 02110, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200258619 A2-A3 20020801 (WO 0258619)
Application: WO 2002US1716 20020122 (PCT/WO US0201716)
Priority Application: US 2001767173 20010122
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG UZ VN YU ZA ZM ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 13638

6/3,AU/11 (Item 11 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
(c) 2004 European Patent Office. All rts. reserv.

01405027
CPR **TRAINING APPARATUS AND METHODS**
DISPOSITIF ET PROCEDES D'ENTRAINEMENT A LA REANIMATION CARDIO- RESPIRATOIRE

PATENT ASSIGNEE:
CPRX LLC, (3001041), 4330 Upton Avenue South, Minneapolis, MN 55410, (US) , (Applicant designated States: all)
INVENTOR:
LURIE, Keith, G. , 4751 girard Avenue South, Minneapolis, MN 55409, (US)
ZIELINSKI, Todd, M. , 48 27th Avenue S.E. 203, Minneapolis, MN 55414, (US
PATENT (CC, No, Kind, Date): WO 2002003905 020117
APPLICATION (CC, No, Date): EP 2001961640 010710; WO 2001US22180 010710
PRIORITY (CC, No, Date): US 614064 000711
DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE; TR
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS: A61H-001/00
LANGUAGE (Publication,Procedural,Application): English; English; English

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6/3,AU/12 (Item 12 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
(c) 2004 WIPO/Univentio. All rts. reserv.

00870227
CPR **TRAINING APPARATUS AND METHODS**
DISPOSITIF ET PROCEDES D'ENTRAINEMENT A LA REANIMATION CARDIO- RESPIRATOIRE

Patent Applicant/Assignee:
CPRX LLC, 4330 Upton Avenue South, Minneapolis, MN 55410, US, US (Residence), US (Nationality)
Inventor(s):
LURIE Keith G , 4751 girard Avenue South, Minneapolis, MN 55409, US,

ZIELINSKI Todd M , 48 27th Avenue S.E. #203, Minneapolis, MN 55414, US
Legal Representative:
GIBBY Darin J (et al) (agent), Townsend and Townsend and Crew LLP, Two Embarcadero Center, 8th floor, San Francisco, CA 94111-3834, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200203905 A2 20020117 (WO 0203905)
Application: WO 2001US22180 20010710 (PCT/WO US0122180)
Priority Application: US 2000614064 20000711
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 7376

6/3,AU/13 (Item 13 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01357151
CPR **MASK WITH COMPRESSION TIMING METRONOME AND METHODS**
KARDIOPULMONARE MASKE MIT METRONOM ZUR ZEITGEBUNG VON KOMPRESSIONEN UND VERFAHREN
MASQUE DE REANIMATION CARDIOPULMONAIRE COMPORTANT UN METRONOME DE SYNCHRONISATION DE COMPRESSION ET PROCEDES
PATENT ASSIGNEE:
Advanced Circulatory Systems, Inc., (4475370), 7615 Golden Triangel Drive, Suite A,, Eden Prairie, Minnesota 55344, (US), (Applicant designated States: all)
INVENTOR:
LURIE, Keith, G. , 4751 Girard Avenue South, Minneapolis, MN 55409, (US)
ZIELINSKI, Todd, M. , 48 27th Avenue S.E. 203, Minneapolis, MN 55414, (US)
SCHARENBROICH, Gene, 1660 Wild Ridge Court S., Newport, MN 55055, (US
LEGAL REPRESENTATIVE:
Evens, Paul Jonathan et al (83933), Maguire Boss, 5 Crown Street, St. Ives, Cambridgeshire PE27 5EB, (GB)
PATENT (CC, No, Kind, Date): EP 1337292 A2 030827 (Basic)
WO 2001070092 010927
APPLICATION (CC, No, Date): EP 2001922429 010316; WO 2001US8505 010316
PRIORITY (CC, No, Date): US 532601 000322
DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE; TR
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS: **A61M-015/00**
NOTE:
No A-document published by EPO
LANGUAGE (Publication,Procedural,Application): English; English; English

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6/3,AU/14 (Item 14 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00836931
CPR **MASK WITH COMPRESSION TIMING METRONOME AND METHODS**
MASQUE DE REANIMATION CARDIOPULMONAIRE COMPORTANT UN METRONOME DE SYNCHRONISATION DE COMPRESSION ET PROCEDES
Patent Applicant/Assignee:
CPRX LLC, 4330 Upton Avenue South, Minneapolis, MN 55410, US, US (Residence), US (Nationality)
Inventor(s):
LURIE Keith G , 4751 Girard Avenue South, Minneapolis, MN 55409, US,
ZIELINSKI Todd M , 48 27th Avenue S.E. #203, Minneapolis, MN 55414, US,
SCHARENBROICH Gene, 1660 Wild Ridge Court S., Newport, MN 55055, US
Legal Representative:
GIBBY Darin J (et al) (agent), Townsend and Townsend and Crew LLP, 1200 Seventeenth Street, Suite 2700, Denver, CO 8022, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200170092 A2-A3 20010927 (WO 0170092)
Application: WO 2001US8505 20010316 (PCT/WO US0108505)
Priority Application: US 2000532601 20000322
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 7129

6/3,AU/15 (Item 15 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01156759
CARDIOPULMONARY RESUSCITATION VENTILATOR **AND METHODS**
KARDIOPULMONALES BEATMUNGSGERAT ZUR REANIMATION UND ZUGEHORIGE METHODEN
VENTILATEUR **ET PROCEDES DE REANIMATION CARDIO-PULMONAIRE**
PATENT ASSIGNEE:
CPRX LLC, (3001040), 4751 Girard Avenue South; Minneapolis, MN 55409, (US), (Applicant designated States: all)
INVENTOR:
LURIE, Keith, G. , 4751 Girard Avenue South, Minneapolis, MN 55409, (US)
ZIELINSKI, Todd, M. , 48 27th Avenue S.E. No.203, Minneapolis, MN 55414, (US
LEGAL REPRESENTATIVE:
Evens, Paul Jonathan et al (83931), Maguire Boss, 5 Crown Street, St. Ives, Cambridge PE27 5EB, (GB)
PATENT (CC, No, Kind, Date): EP 1119385 A1 010801 (Basic)
WO 200020061 000413
APPLICATION (CC, No, Date): EP 99951803 991005; WO 99US23233 991005
PRIORITY (CC, No, Date): US 168049 981007
DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS: **A61M-016/00**
NOTE:
No A-document published by EPO
LANGUAGE (Publication,Procedural,Application): English; English; English

6/3,AU/16 (Item 16 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
(c) 2004 WIPO/Univentio. All rts. reserv.

00556688
CARDIOPULMONARY RESUSCITATION VENTILATOR **AND METHODS**
VENTILATEUR **ET PROCEDES DE REANIMATION CARDIO-PULMONAIRE**
Patent Applicant/Assignee:
CPRX LLC,
Inventor(s):
LURIE Keith G ,
ZIELINSKI Todd M
Patent and Priority Information (Country, Number, Date):
Patent: WO 200020061 A1 20000413 (WO 0020061)
Application: WO 99US23233 19991005 (PCT/WO US9923233)
Priority Application: US 98168049 19981007
Designated States: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW GH GM KE LS MW SD SL SZ TZ UG ZW AM AZ BY KG KZ MD RU TJ TM AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
Publication Language: English
Fulltext Word Count: 11470

6/3,AU/17 (Item 17 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
(c) 2004 European Patent Office. All rts. reserv.

01118682
STIMULATORY DEVICE AND METHODS TO ENHANCE VENOUS BLOOD RETURN DURING CARDIOPULMONARY RESUSCITATION
STIMULIERUNGSVORRICHTUNG SOWIE VERFAHREN ZUM VERBESSERN DES VENOSEN BLUTRUCKLAUFS WAHREND EINER KARDIOPULMONAREN REANIMATION
DISPOSITIFS ET PROCEDES DE STIMULATION PERMETTANT D'AMELIORER LE RETOUR VEINEUX EN COURS DE REANIMATION CARDIORESPIRATOIRE
PATENT ASSIGNEE:
CPRX LLC, (3001040), 4751 Girard Avenue South, Minneapolis, MN 55409, (US), (Applicant designated States: all)
INVENTOR:
LURIE, Keith, G. , 4751 Girard Avenue South, Minneapolis, MN 55409, (US)
BENDITT, David, G., 2 Circle West, Edina, MN 55436, (US)
ZIELINSKI, Todd, M. , 48 27th Avenue S.E. 203, Minneapolis, MN 55414, (US)
VOECKEL, Wolfgang, Krehbachgasse 13C, A-6410 Telfs, (AT)
PATTERSON, Robert, 3761 Foss Road, Minneapolis, MN 55421, (US
LEGAL REPRESENTATIVE:
Harrison, David Christopher et al (31532), MEWBURN ELLIS York House 23 Kingsway, London WC2B 6HP, (GB)
PATENT (CC, No, Kind, Date): EP 1098622 A2 010516 (Basic)
WO 9963926 991216
APPLICATION (CC, No, Date): EP 99927453 990610; WO 99US13161 990610
PRIORITY (CC, No, Date): US 95916 980611; US 197286 981120; US 315396 990520
DESIGNATED STATES: DE; FR; GB
INTERNATIONAL PATENT CLASS: A61H-001/00
NOTE:

No A-document published by EPO
LANGUAGE (Publication,Procedural,Application): English; English; English

6/3,AU/18 (Item 18 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00532574
STIMULATORY DEVICE AND METHODS TO ENHANCE VENOUS BLOOD RETURN DURING CARDIOPULMONARY RESUSCITATION
DISPOSITIFS ET PROCEDES DE STIMULATION PERMETTANT D'AMELIORER LE RETOUR VEINEUX EN COURS DE REANIMATION CARDIORESPIRATOIRE
Patent Applicant/Assignee:
CPRx LLP,
Inventor(s):
LURIE Keith G ,
BENDITT David G,
ZIELINSKI Todd M ,
VOECKEL Wolfgang,
PATTERSON Robert
Patent and Priority Information (Country, Number, Date):
Patent: WO 9963926 A2 19991216
Application: WO 99US13161 19990610 (PCT/WO US9913161)
Priority Application: US 9895916 19980611; US 98197286 19981120; US 99315396 19990520
Designated States: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG UZ VN YU ZA ZW GH GM KE LS MW SD SL SZ UG ZW AM AZ BY KG KZ MD RU TJ TM AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
Publication Language: English
Fulltext Word Count: 13343

6/3,AU/19 (Item 19 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01092788
VENTILATOR **CONTROL SYSTEM AND METHOD**
STEUERVORRICHTUNG FUR BEATMUNGSGERAT SOWIE VERFAHREN
SYSTEME ET PROCEDE DE COMMANDE D'UN VENTILATEUR
PATENT ASSIGNEE:
CARDIOPULMONARY CORPORATION, (1156111), 200 Cascade Boulevard, Milford, CT 06460, (US), (Applicant designated States: all)
INVENTOR:
BIONDI, James, W. , 1601 Ridge Road, North Haven, CT 06473, (US)
JOHNSTON, Douglas, M., 48 Winthrop Street, Winchester, MA 01890, (US)
SCHROEDER, Gerhardt, P., 24 Seasons Lane, Londonderry, NH 03053, (US)
GILMORE, Donald, D., 1083 Kupulau Drive, Kiehi, HI 96753, (US)
REYNOLDS, Robert, 299 Townsend Street, New Haven, CT 06512, (US
PATENT (CC, No, Kind, Date): WO 9947200 990923
APPLICATION (CC, No, Date): WO 99913981 990319; WO 99US6056 990319
PRIORITY (CC, No, Date): US 45461 980320
DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE
INTERNATIONAL PATENT CLASS: **A61M-016/00**

LANGUAGE (Publication,Procedural,Application): English; English; English

6/3,AU/20 (Item 20 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
(c) 2004 WIPO/Univentio. All rts. reserv.

00515848
VENTILATOR **CONTROL SYSTEM AND METHOD**
SYSTEME ET PROCEDE DE COMMANDE D'UN VENTILATEUR
Patent Applicant/Assignee:
CARDIOPULMONARY CORPORATION,
Inventor(s):
BIONDI James W ,
JOHNSTON Douglas M,
SCHROEDER Gerhardt P,
GILMORE Donald D,
REYNOLDS Robert
Patent and Priority Information (Country, Number, Date):
Patent: WO 9947200 A1 19990923
Application: WO 99US6056 19990319 (PCT/WO US9906056)
Priority Application: US 9845461 19980320
Designated States: IL AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE
Publication Language: English
Fulltext Word Count: 12115

6/3,AU/21 (Item 21 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
(c) 2004 European Patent Office. All rts. reserv.

00958085
HEART FAILURE TREATMENT METHOD REQUIRING SET NEGATIVE **INTRATHORACIC** PRESSURE
EINEN DEFINIERTEN NEGATIVEN INNEREN THORAXDRUCK ERFORDERNDES VERFAHREN ZUM BEHANDELN VON HERZVERSAGEN
PROCEDE DE TRAITEMENT DES INSUFFISANCES CARDIAQUES NECESSITANT UNE PRESSION INTRATHORACIQUE NEGATIVE DEFINIE
PATENT ASSIGNEE:
CPRX, INC., (2305590), 4751 Girard Avenue South, Minneapolis, MN 55409, (US), (Applicant designated States: all)
INVENTOR:
LURIE, Keith, G. , 4751 Girard Avenue South, Minneapolis, MN 55409, (US
LEGAL REPRESENTATIVE:
Sanderson, Michael John et al (35592), MEWBURN ELLIS York House 23 Kingsway, London WC2B 6HP, (GB)
PATENT (CC, No, Kind, Date): EP 949941 A1 991020 (Basic)
WO 9820938 980522
APPLICATION (CC, No, Date): EP 97946595 971112; WO 97US20378 971112
PRIORITY (CC, No, Date): US 747371 961112
DESIGNATED STATES: DE; FR; GB
INTERNATIONAL PATENT CLASS: **A62B-018/10** ; **A62B**-018/02
NOTE:
No A-document published by EPO
LANGUAGE (Publication,Procedural,Application): English; English; English

6/3,AU/22 (Item 22 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
(c) 2004 WIPO/Univentio. All rts. reserv.

00430474
HEART FAILURE TREATMENT METHOD REQUIRING SET NEGATIVE INTRATHORACIC PRESSURE
PROCEDE DE TRAITEMENT DES INSUFFISANCES CARDIAQUES NECESSITANT UNE PRESSION INTRATHORACIQUE NEGATIVE DEFINIE
Patent Applicant/Assignee:
CPRx INC,
Inventor(s):
LURIE Keith G
Patent and Priority Information (Country, Number, Date):
Patent: WO 9820938 A1 19980522
Application: WO 97US20378 19971112 (PCT/WO US9720378)
Priority Application: US 96747371 19961112
Designated States: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GE GH HU ID IL IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG UZ VN YU ZW GH KE LS MW SD SZ UG ZW AM AZ BY KG KZ MD RU TJ TM AT BE CH DE DK ES FI FR GB GR IE IT LU MC NL PT SE BF BJ CF CG CI CM GA GN ML MR NE SN TD TG
Publication Language: English
Fulltext Word Count: 4340

6/3,AU/23 (Item 23 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00895107
COMBINATIONS OF VASOPRESSIN AND ADRENERGIC AGENTS FOR THE TREATMENT OF CARDIAC ARREST
KOMBINATIONEN VON VASOPRESSIN UND ADRENERGISCHEN WIRKSTOFFEN ZUR BEHANDLUNG DES PLOTZLICHEN HERZTODS
ASSOCIATIONS DE VASOPRESSINE ET D'AGENTS ADRENERGIQUES POUR LE TRAITEMENT DES ARRETS CARDIAQUES
PATENT ASSIGNEE:
Lurie, Keith G., (1986760), 4751 Girard Avenue South, Minneapolis, MN 55409, (US), (Proprietor designated states: all)
Lindner, Karl, (2403880), Steinhovelstrasse 9, 89075 Ulm, (DE), (Proprietor designated states: all)
INVENTOR:
Lurie, Keith G. , 4751 Girard Avenue South, Minneapolis, MN 55409, (US)
Lindner, Karl, Steinhovelstrasse 9, 89075 Ulm, (DE
LEGAL REPRESENTATIVE:
Hay, Martin Alexander (59434), Martin A. Hay & Co. 13 Queen Victoria Street, Macclesfield Cheshire SK11 6LP, (GB)
PATENT (CC, No, Kind, Date): EP 904097 A2 990331 (Basic)
EP 904097 B1 030528
WO 97036609 971009
APPLICATION (CC, No, Date): EP 97917089 970327; WO 97US5056 970327
PRIORITY (CC, No, Date): US 625733 960329
DESIGNATED STATES: AT; BE; CH; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE
INTERNATIONAL PATENT CLASS: A61K-038/11; A61K-031/55; A61P-009/04
NOTE:
No A-document published by EPO
LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	200322	672

CLAIMS B	(German)	200322	681
CLAIMS B	(French)	200322	750
SPEC B	(English)	200322	6372
Total word count - document A			0
Total word count - document B			8475
Total word count - documents A + B			8475

6/3,AU/24 **(Item 24 from file: 349)**
DIALOG(R)File 349:PCT FULLTEXT
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00395866
COMBINATIONS OF VASOPRESSIN AND ADRENERGIC AGENTS FOR THE TREATMENT OF CARDIAC ARREST
ASSOCIATIONS DE VASOPRESSINE ET D'AGENTS ADRENERGIQUES POUR LE TRAITEMENT DES ARRETS CARDIAQUES
Patent Applicant/Assignee:
LURIE Keith G,
LINDNER Karl,
Inventor(s):
LURIE Keith G ,
LINDNER Karl
Patent and Priority Information (Country, Number, Date):
Patent: WO 9736609 A2 19971009
Application: WO 97US5056 19970327 (PCT/WO US9705056)
Priority Application: US 96625733 19960329
Designated States: AU CA JP AT BE CH DE DK ES FI FR GB GR IE IT LU MC NL PT SE
Publication Language: English
Fulltext Word Count: 8350

6/3,AU/25 **(Item 25 from file: 348)**
DIALOG(R)File 348:EUROPEAN PATENTS
(c) 2004 European Patent Office. All rts. reserv.

00804856
CPR **DEVICE HAVING STRUCTURE FOR INCREASING THE DURATION AND MAGNITUDE OF** NEGATIVE **INTRA-THORACIC** PRESSURE
HERZ-LUNGEN-WIEDERBELEBUNGSEINRICHTUNG MIT DER MOGLICHKEIT ZUM ERHOHEN DER DAUER UND DES BETRAGES DES NEGATIVEN INNEREN THORAXDRUCKS
DISPOSITIF DE REANIMATION CARDIO-PULMONAIRE A STRUCTURE AUGMENTANT LA DUREE ET L'INTENSITE D'UNE PRESSION INTRA-THORACIQUE NEGATIVE.
PATENT ASSIGNEE:
CPRX, LLC., (4268230), 7615 Golden Triangle Drive, Suite A, Technology Park #5, Eden Prairie, MN 55344, (US), (Proprietor designated states: all)
INVENTOR:
LURIE, Keith, G. , 4751 Girard Avenue South, Minneapolis, MN 55409, (US)
SWEENEY, Michael, 1525 Goodrich Avenue, St. Paul, MN 55105, (US)
GOLD, Barbara, 4751 Girard Avenue South, Minneapolis, MN 55409, (US
LEGAL REPRESENTATIVE:
Sanderson, Michael John et al (35592), MEWBURN ELLIS York House 23 Kingsway, London WC2B 6HP, (GB)
PATENT (CC, No, Kind, Date): EP 898485 A1 990303 (Basic)
EP 898485 A1 990512
EP 898485 B1 030502
WO 96028215 960919
APPLICATION (CC, No, Date): EP 96905523 960216; WO 96US2097 960216

PRIORITY (CC, No, Date): US 403009 950310
DESIGNATED STATES: DE; FR; GB; IT; SE
INTERNATIONAL PATENT CLASS: **A62B-007/00 ; A62B-009/02 ; A61M-016/04 ; A61M-016/20**
NOTE:
No A-document published by EPO
LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	200318	1103
CLAIMS B	(German)	200318	1185
CLAIMS B	(French)	200318	1195
SPEC B	(English)	200318	9175
Total word count - document A			0
Total word count - document B			12658
Total word count - documents A + B			12658

6/3,AU/26 (Item 26 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00345702
CPR **DEVICE HAVING STRUCTURE FOR INCREASING THE DURATION AND MAGNITUDE OF** NEGATIVE **INTRA-THORACIC** PRESSURE
DISPOSITIF DE REANIMATION CARDIO-PULMONAIRE A STRUCTURE AUGMENTANT LA DUREE ET L'INTENSITE D'UNE PRESSION INTRA-THORACIQUE NEGATIVE.
Patent Applicant/Assignee:
LURIE Keith G,
SWEENEY Michael,
GOLD Barbara,
Inventor(s):
LURIE Keith G ,
SWEENEY Michael,
GOLD Barbara
Patent and Priority Information (Country, Number, Date):
Patent: WO 9628215 A1 19960919
Application: WO 96US2097 19960216 (PCT/WO US9602097)
Priority Application: US 95403009 19950310
Designated States: AL AM AT AU AZ BB BG BR BY CA CH CN CZ DE DK EE ES FI GB GE HU IS JP KE KG KP KR KZ LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK TJ TM TR TT UA UG US UZ VN KE LS MW SD SZ UG AZ BY KG KZ MD RU TJ TM AT BE CH DE DK ES FR GB GR IE IT LU MC NL PT SE BF BJ CF CG CI CM GA GN ML MR NE SN TD TG
Publication Language: English
Fulltext Word Count: 10995

6/3,AU/27 (Item 27 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00783455
RESPIRATOR
BEATMUNGSGERAT
RESPIRATEUR
PATENT ASSIGNEE:
CARDIOPULMONARY CORPORATION, (1156111), 200 Cascade Boulevard, Milford, CT 06460, (US), (Proprietor designated states: all)
INVENTOR:

SCHROEDER, Gary, 24 Seasons Lane, North Londonderry, NH 03053, (US)
BIONDI, James, W. , 1601 Ridge Road, North Haven, CT 06473, (US)
JOHNSTON, Douglas, M., 48 Winthrop Street, Winchester, MA 01890, (US
LEGAL REPRESENTATIVE:
Kirkham, Nicholas Andrew et al (83451), Graham Watt & Co., Riverhead, Sevenoaks, Kent TN13 2BN, (GB)
PATENT (CC, No, Kind, Date): EP 796119 A1 970924 (Basic)
EP 796119 B1 991027
WO 9617641 960613
APPLICATION (CC, No, Date): EP 95944311 951204; WO 95US15706 951204
PRIORITY (CC, No, Date): US 352658 941209
DESIGNATED STATES: DE; FR; GB; SE
INTERNATIONAL PATENT CLASS: **A61M-016/00**
NOTE:
No A-document published by EPO
LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	9943	555
CLAIMS B	(German)	9943	562
CLAIMS B	(French)	9943	646
SPEC B	(English)	9943	3557
Total word count - document A			0
Total word count - document B			5320
Total word count - documents A + B			5320

6/3,AU/28 (Item 28 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
(c) 2004 WIPO/Univentio. All rts. reserv.

00335129
RESPIRATOR
RESPIRATEUR
Patent Applicant/Assignee:
CARDIOPULMONARY CORPORATION,
Inventor(s):
SCHROEDER Gary,
BIONDI James W ,
JOHNSTON Douglas M
Patent and Priority Information (Country, Number, Date):
Patent: WO 9617641 A1 19960613
Application: WO 95US15706 19951204 (PCT/WO US9515706)
Priority Application: US 94352658 19941209
Designated States: AU CA JP KR NZ AT BE CH DE DK ES FR GB GR IE IT LU MC NL PT SE
Publication Language: English
Fulltext Word Count: 5053

6/3,AU/29 (Item 29 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
(c) 2004 European Patent Office. All rts. reserv.

00703210
DEVICE FOR ASSISTING CARDIOPULMONARY RESUSCITATION
VORRICHTUNG ZUR UNTERSTUTZUNG BEI KARDIOPULMONALER WIEDERBELEBUNG
DISPOSITIF D'ASSISTANCE A LA REANIMATION CARDIO-PULMONAIRE
PATENT ASSIGNEE:
CPRX, LLC., (4268230), 7615 Golden Triangle Drive, Suite A, Technology Park #5, Eden Prairie, MN 55344, (US), (Proprietor designated states:

all)
INVENTOR:
Lurie, Keith G. , 4751 Girard Avenue South, Minneapolis, MN 55409, (US)
Sweeney, Michael, 1525 Goodrich Avenue, St. Paul, MN 55105, (US)
Gold, Barbara, 4751 Girard Avenue South, Minneapolis, MN 55409, (US
LEGAL REPRESENTATIVE:
Harrison, David Christopher (31532), MEWBURN ELLIS York House 23 Kingsway , London WC2B 6HP, (GB)
PATENT (CC, No, Kind, Date): EP 728028 A1 960828 (Basic)
EP 728028 A1 970604
EP 728028 B1 030521
WO 95013108 950518
APPLICATION (CC, No, Date): EP 95901822 941107; WO 94US12870 941107
PRIORITY (CC, No, Date): US 149204 931109
DESIGNATED STATES (Pub A): AT; BE; CH; DE; DK; ES; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE; (Pub B): DE; ES; FR; GB; IT; NL; SE
INTERNATIONAL PATENT CLASS: **A61M-015/00** ; **A61M-016/00** ; **A62B-007/00** ; **A62B-009/06** ; **A62B-018/02** ; A61H-031/00
NOTE:
No A-document published by EPO
LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	200321	257
CLAIMS B	(German)	200321	274
CLAIMS B	(French)	200321	275
SPEC B	(English)	200321	5414
Total word count - document A			0
Total word count - document B			6220
Total word count - documents A + B			6220

6/3,AU/30 (Item 30 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
(c) 2004 WIPO/Univentio. All rts. reserv.

00294959
METHOD AND DEVICE FOR ASSISTING CARDIOPULMONARY RESUSCITATION
PROCEDE ET DISPOSITIF D'ASSISTANCE A LA REANIMATION CARDIO-PULMONAIRE
Patent Applicant/Assignee:
LURIE Keith G,
SWEENEY Michael,
GOLD Barbara,
Inventor(s):
LURIE Keith G ,
SWEENEY Michael,
GOLD Barbara
Patent and Priority Information (Country, Number, Date):
Patent: WO 9513108 A1 19950518
Application: WO 94US12870 19941107 (PCT/WO US9412870)
Priority Application: US 93149204 19931109
Designated States: AM AT AU BB BG BR BY CA CH CN CZ DE DK EE ES FI GB GE HU JP KE KG KP KR KZ LK LR LT LU LV MD MG MN MW NL NO NZ PL PT RO RU SD SE SI SK TJ TT UA UZ VN KE MW SD SZ AT BE CH DE DK ES FR GB GR IE IT LU MC NL PT SE BF BJ CF CG CI CM GA GN ML MR NE SN TD TG
Publication Language: English
Fulltext Word Count: 7094

6/3,AU/31 (Item 31 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00801713
Coronary sinus catheter
Koronarsinus Katheter
Catheter pour le sinus coronaire
PATENT ASSIGNEE:
DAIG CORPORATION, (1027891), 14901 DeVeau Place, Minnetonka, Minnesota 55345-2126, (US), (Proprietor designated states: all)
INVENTOR:
Lurie, Keith G. , 4751 Girard Avenue, South, Minneapolis, MN 55409, (US)
Benditt, David G., No. 2 Circle West, Edina, Minnesota, (US)
Shultz, Jeffrey J., 4600 Ewing Ave., N., Robbinsdale, MN 55422, (US)
Ockuly, John D., 14901 DeVeau Place, Minnetonka, MN 55345, (US)
Fleischhacker, John J., 14901 DeVeau Place, Minnetonka, MN 55345, (US
LEGAL REPRESENTATIVE:
Splanemann Reitzner Baronetzky Westendorp Patentanwalte (100431), Rumfordstrasse 7, 80469 Munchen, (DE)
PATENT (CC, No, Kind, Date): EP 745406 A2 961204 (Basic)
EP 745406 A3 970205
EP 745406 B1 030813
APPLICATION (CC, No, Date): EP 96102200 960214;
PRIORITY (CC, No, Date): US 457675 950601
DESIGNATED STATES: AT; CH; DE; ES; FR; GB; IT; LI; NL; SE
INTERNATIONAL PATENT CLASS: **A61M-025/00** ; A61N-001/39; **A61M-025/01**
ABSTRACT WORD COUNT: 99
NOTE:
Figure number on first page: 2 3
LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPAB96	353
CLAIMS B	(English)	200333	198
CLAIMS B	(German)	200333	203
CLAIMS B	(French)	200333	211
SPEC A	(English)	EPAB96	3826
SPEC B	(English)	200333	3855
Total word count - document A			4180
Total word count - document B			4467
Total word count - documents A + B			8647

6/3,AU/32 (Item 32 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00644535
Cardiopulmonary resuscitation **device**
Kardiopulmonare Wiederbelebungsvorrichtung
Dispositif pour la reanimation cardio-pulmonaire
PATENT ASSIGNEE:
THE REGENTS OF THE UNIVERSITY OF CALIFORNIA, (221072), 300 Lakeside Drive, 22nd Floor, Oakland, California 94612-3550, (US), (applicant designated states: AT;BE;CH;DE;DK;ES;FR;GB;GR;IE;IT;LI;LU;MC;NL;PT;SE)
AMBU INTERNATIONAL A/S, (965372), Sondre Ringvej 49, P.O. Box 215, 2600 Glostrup, Copenhagen, (DK), (applicant designated states: AT;BE;CH;DE;DK;ES;FR;GB;GR;IE;IT;LI;LU;MC;NL;PT;SE)
INVENTOR:
Lurie, Keith G. , 4751 Girard Avenue South, Minneapolis, Minnesota 55409 , (US)

Kohnke, Ole B., Vagtelvej 32, DK-2000 Frederiksberg, (DK)
Cohen, Todd J., 4 Orchard Farm Road, Port Washington, New York 11050, (US
LEGAL REPRESENTATIVE:
Tiedtke, Harro, Dipl.-Ing. et al (11949), Patentanwaltsburo
Tiedtke-Buhling-Kinne & Partner Bavariaring 4, 80336 Munchen, (DE)
PATENT (CC, No, Kind, Date): EP 623334 A1 941109 (Basic)
EP 623334 B1 990609
APPLICATION (CC, No, Date): EP 94106492 940426;
PRIORITY (CC, No, Date): US 58195 930504
DESIGNATED STATES: AT; BE; CH; DE; DK; ES; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE
INTERNATIONAL PATENT CLASS: A61H-031/00;
ABSTRACT WORD COUNT: 161
LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	9923	431
CLAIMS B	(German)	9923	439
CLAIMS B	(French)	9923	500
SPEC B	(English)	9923	4230
Total word count - document A			0
Total word count - document B			5600
Total word count - documents A + B			5600

6/3,AU/33 (Item 33 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00539057
Device for external chest compression
Vorrichtung zur externen Kompression des Brustkastens
Dispositif pour la compression externe du thorax
PATENT ASSIGNEE:
THE REGENTS OF THE UNIVERSITY OF CALIFORNIA, (221072), 300 Lakeside Drive, 22nd Floor, Oakland, California 94612-3550, (US), (applicant designated states: DE;ES;FR;GB;IT)
INVENTOR:
Lurie, Keith G. , 835 - 33rd Avenue, San Francisco, California 94121, (US)
Cohen, Todd J., 1234 Stanyan Street, San Francisco, California 94117, (US
LEGAL REPRESENTATIVE:
Harrison, David Christopher et al (31532), MEWBURN ELLIS York House 23 Kingsway, London WC2B 6HP, (GB)
PATENT (CC, No, Kind, Date): EP 509773 A1 921021 (Basic)
EP 509773 B1 980107
APPLICATION (CC, No, Date): EP 92303367 920415;
PRIORITY (CC, No, Date): US 686542 910417
DESIGNATED STATES: DE; ES; FR; GB; IT
INTERNATIONAL PATENT CLASS: A61H-031/00;
ABSTRACT WORD COUNT: 111
LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	9802	455
CLAIMS B	(German)	9802	436
CLAIMS B	(French)	9802	483
SPEC B	(English)	9802	4194
Total word count - document A			0
Total word count - document B			5568
Total word count - documents A + B			5568

6/3,AU/34 (Item 34 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
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01105581
STRESS TEST DEVICES AND METHODS
DISPOSITIFS D'EPREUVE D'EFFORTS ET PROCEDES Y RELATIFS
Patent Applicant/Assignee:
ADVANCED CIRCULATORY SYSTEMS INC, 7615 Golden Triangle Drive, Suite A, Technology Park #5, Eden Prairie, MN 55344, US, US (Residence), US (Nationality)
Inventor(s):
LURIE Keith G , 4751 Girard Avenue South, Minneapolis, MN 55409, US
Legal Representative:
GIBBY Darin J (et al) (agent), Townsend and Townsend and Crew LLP, Two Embarcadero Center, Eighth Floor, San Francisco, CA 94111-3834, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200426101 A2 20040401 (WO 0426101)
Application: WO 2003US29210 20030919 (PCT/WO US03029210)
Priority Application: US 2002251080 20020920
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE EG ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NI NO NZ OM PG PH PL PT RO RU SC SD SE SG SK SL SY TJ TM TN TR TT TZ UA UG UZ VC VN YU ZA ZM ZW
(EP) AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LU MC NL PT RO SE SI SK TR
(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 5304

6/3,AU/35 (Item 35 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
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00935977
NETWORK MONITORING SYSTEMS FOR MEDICAL DEVICES
SYSTEMES DE SURVEILLANCE EN RESEAU POUR DISPOSITIFS MEDICAUX
Patent Applicant/Assignee:
CARDIOPULMONARY CORPORATION, 200 Cascade Boulevard, Milford, CT 06460, US , US (Residence), US (Nationality)
Inventor(s):
BIONDI James W , 1601 Ridge Road, North Haven, CT 06473, US,
FAND Aaron, 153 Laurel Terrace, Cheshire, CT 06410, US
Legal Representative:
MOORE Ronda P (agent), Testa, Hurwitz & Thibeault, LLP, High Street Tower, 125 High Street, Boston, MA 02110, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200269181 A2-A3 20020906 (WO 0269181)
Application: WO 2002US4515 20020219 (PCT/WO US0204515)
Priority Application: US 2001791334 20010223
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG UZ VN YU ZA ZM ZW

(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 6734

6/3,AU/36 **(Item 36 from file: 349)**
DIALOG(R)File 349:PCT FULLTEXT

00837059
STIMULATORY DEVICE AND METHODS TO ELECTRICALLY STIMULATE THE PHRENIC NERVE
DISPOSITIF ET METHODES DE STIMULATION PERMETTANT DE STIMULER LE NERF PHRENIQUE
Patent Applicant/Assignee:
CPRX LLC, 4330 Upton Avenue South, Minneapolis, MN 55410, US, US (Residence), US (Nationality)
Inventor(s):
ZIELINSKI Todd M , 48 27th Avenue S.E. #203, Minneapolis, MN 55414, US,
LURIE Keith G , 4751 Girard Avenue South, Minneapolis, MN 55409, US,
VOELCKEL Wolfgang, Krehbachgasse 13C, A-6410 Telfs, AT,
PATTERSON Robert, 3761 Foss Road, Minneapolis, MN 55421, US,
SAMNIAH Nemer, Khury Street 23, Haifa, IL,
MCKNITE Scott, 4217 Bryant Avenue South, Minneapolis, MN 55409, US,
LINDNER Karl, Gartenweg 21, A-6161 Natters, AT
Legal Representative:
GIBBY Darin J (et al) (agent), Townsend and Townsend and Crew LLP, 1200 Seventeenth Street, Ste 2700, Denver, CO 80202, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200170332 A2-A3 20010927 (WO 0170332)
Application: WO 2001US8687 20010316 (PCT/WO US0108687)
Priority Application: US 2000533880 20000322
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ
DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ
LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG
SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 19506

6/3,AU/37 **(Item 37 from file: 349)**
DIALOG(R)File 349:PCT FULLTEXT

00454522
DEVICE AND METHOD FOR DETECTION AND TREATMENT OF SYNCOPE
DISPOSITIF ET PROCEDE POUR LA DETECTION ET LE TRAITEMENT DE LA SYNCOPE
Patent Applicant/Assignee:
PHARMATARGET INC,
Inventor(s):
LURIE Keith G ,
BENDITT David,

OBINO Stanislao F,
BUSCEMI Paul J
Patent and Priority Information (Country, Number, Date):
Patent: WO 9844986 A1 19981015
Application: WO 98US7364 19980408 (PCT/WO US9807364)
Priority Application: US 97608 19970410
Designated States: CA JP AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE
Publication Language: English
Fulltext Word Count: 3486

6/3,AU/38 (Item 38 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
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00262876
METHODS AND PHARMACEUTICAL COMPOSITIONS FOR ENHANCED CARDIOPULMONARY RESUSCITATION
PROCEDES ET COMPOSITIONS PHARMACEUTIQUES FAVORISANT LA REANIMATION CARDIO-RESPIRATOIRE
Patent Applicant/Assignee:
REGENTS OF THE UNIVERSITY OF MINNESOTA,
Inventor(s):
LURIE Keith G ,
GOLD Barbara S
Patent and Priority Information (Country, Number, Date):
Patent: WO 9411045 A1 19940526
Application: WO 93US11034 19931115 (PCT/WO US9311034)
Priority Application: US 92977498 19921117
Designated States: AU CA JP KR AT BE CH DE DK ES FR GB GR IE IT LU MC NL PT SE
Publication Language: English
Fulltext Word Count: 5137

6/3,AU/39 (Item 39 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
(c) 2004 WIPO/Univentio. All rts. reserv.

00162658
CIRCULATORY ASSIST METHOD AND APPARATUS
PROCEDE ET APPAREIL D'ASSISTANCE CIRCULATOIRE
Patent Applicant/Assignee:
CARDIOPULMONARY CORPORATION,
Inventor(s):
BIONDI James W ,
MENTELOS Richard A
Patent and Priority Information (Country, Number, Date):
Patent: WO 8909041 A1 19891005
Application: WO 89US1356 19890331 (PCT/WO US8901356)
Priority Application: US 88810 19880331
Designated States: AT AU BE CH DE DK FI FR GB IT JP KR LU NL NO SE
Publication Language: English
Fulltext Word Count: 7912

```
Set      Items   Description
S1        1789   AU=(LURIE K? OR LURIE, K? OR MENK V? OR MENK, V? OR ZIELIN-
             SKI T? OR ZIELINSKI, T? OR BIONDI J? OR BIONDI, J?)
S2           0   KEITH(2W)LURIE OR VERN(2W)MENK OR TODD(2W)ZIELINSKI OR JAM-
             ES(2W)BIONDI
S3     2545948   RESUSC? OR RESPIRAT? OR BREATH? OR VENTILAT? OR CPR OR PEEP
              OR (POSITIVE OR NEGATIVE)(2N)PRESSUR?
S4         512   S1:S2 AND S3
S5         110   S4 AND VALV?
S6         110   S5 AND PY<2004
S7          44   RD (unique items)
? show files
File 155:MEDLINE(R) 1966-2004/May W2
         (c) format only 2004 The Dialog Corp.
File   2:INSPEC 1969-2004/May W1
         (c) 2004 Institution of Electrical Engineers
File   5:Biosis Previews(R) 1969-2004/May W2
         (c) 2004 BIOSIS
File   6:NTIS 1964-2004/May W2
         (c) 2004 NTIS, Intl Cpyrght All Rights Res
File   8:Ei Compendex(R) 1970-2004/May W1
         (c) 2004 Elsevier Eng.  Info. Inc.
File  34:SciSearch(R) Cited Ref Sci 1990-2004/May W2
         (c) 2004 Inst for Sci Info
File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec
         (c) 1998 Inst for Sci Info
File  73:EMBASE 1974-2004/May W1
         (c) 2004 Elsevier Science B.V.
File  71:ELSEVIER BIOBASE 1994-2004/May W1
         (c) 2004  Elsevier Science B.V.
File 144:Pascal 1973-2004/May W1
         (c) 2004 INIST/CNRS
File  35:Dissertation Abs Online 1861-2004/Apr
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7/3,K/1 (Item 1 from file: 155)
DIALOG(R)File 155:MEDLINE(R)

13853409 PMID: 9554651
Optimizing standard cardiopulmonary resuscitation **with an inspiratory impedance threshold** valve .
Lurie K G ; Mulligan K A; McKnite S; Detloff B; Lindstrom P; Lindner K H
Cardiac Arrhythmia Center, Cardiovascular Division, University of Minnesota, Minneapolis, USA.
Chest (UNITED STATES) Apr **1998** , 113 (4) p1084-90, ISSN 0012-3692
Journal Code: 0231335
Document type: Journal Article
Languages: ENGLISH
Main Citation Owner: NLM
Record type: Completed

Optimizing standard cardiopulmonary resuscitation **with an inspiratory impedance threshold** valve .
Lurie K G ; Mulligan K A; McKnite S; Detloff B; Lindstrom P; Lindner K H
Apr **1998** ,
... to assess whether intermittent impedance of inspiratory gas exchange improves the efficiency of standard cardiopulmonary **resuscitation** (**CPR**). BACKGROUND: Standard **CPR** relies on the natural elastic recoil of the chest to transiently decrease intrathoracic pressures and thereby promote venous blood return to the heart. To further enhance the **negative** intrathoracic **pressures** during the "relaxation" phase of **CPR** , we tested the hypothesis that intermittent impedance to inspiratory gases during standard **CPR** increases coronary perfusion pressures and vital organ perfusion. METHODS: **CPR** was performed with a pneumatically driven automated device in a porcine model of ventricular fibrillation. Eight pigs were randomized to initially receive standard **CPR** alone, while seven pigs initially received standard **CPR** plus intermittent impedance to inspiratory gas exchange with a threshold **valve** set to -40 cm H2O. The compression: **ventilation** ratio was 5:1 and the compression rate was 80/min. At 7-min intervals the impedance threshold **valve** (ITV) was either added or removed from the **ventilation** circuit such that during the 28 min of **CPR** , each animal received two 7-min periods of **CPR** with the ITV and two 7-min periods without the **valve** . RESULTS: Vital organ blood flow was significantly higher during **CPR** performed with the ITV than during **CPR** performed without the **valve** . Total left ventricular blood flow (mean+/-SEM) (mL/min/g) was 0.32+/-0.04...

... vital organ blood flow and coronary perfusion pressure. CONCLUSIONS: Intermittent impedance to inspiratory flow of **respiratory** gases during standard **CPR** significantly improves **CPR** efficiency during ventricular fibrillation. These studies underscore the importance of lowering intrathoracic pressures during the relaxation phase of **CPR** .
Descriptors: Cardiopulmonary **Resuscitation** --methods--MT; *Ventricular Fibrillation--therapy--TH; Animals; Biomechanics; Cardiopulmonary **Resuscitation** --instrumentation--IS; Coronary Circulation; Evaluation Studies; Heart Arrest--physiopathology--PP; Heart Arrest--therapy--TH; Pressure...

7/3,K/2 (Item 2 from file: 155)
DIALOG(R)File 155:MEDLINE(R)

13726764 PMID: 9420954
Recent advances in mechanical methods of cardiopulmonary resuscitation .

Lurie K G
Cardiac Arrhythmia Center, University of Minnesota, Minneapolis, USA.
Acta anaesthesiologica Scandinavica. Supplementum (DENMARK) **1997** , 111 p49-52, ISSN 0515-2720 Journal Code: 0370271
Document type: Journal Article
Languages: ENGLISH
Main Citation Owner: NLM
Record type: Completed

Recent advances in mechanical methods of cardiopulmonary resuscitation .

Lurie K G
1997 ,
Several new **CPR** techniques and devices have been developed and tested since the first report of manual closed-chested cardiopulmonary **resuscitation** (**CPR**) nearly four decades ago. These devices and techniques include vest **CPR** , interposed abdominal counterpulation **CPR** , active compression-decompression **CPR** , an impedance threshold **valve** , intra-aortic balloon pump and phased thoracic-abdominal counterpulsation. Many of these new mechanical advances...
Descriptors: Cardiopulmonary **Resuscitation** --methods--MT; Abdomen --physiology--PH; Blood Circulation; Blood Pressure; Cardiopulmonary **Resuscitation** --instrumentation--IS; Counterpulsation--instrumentation--IS ; Counterpulsation--methods--MT; Equipment Design; Heart Arrest--therapy --TH; Inhalation...

7/3,K/3 (Item 3 from file: 155)
DIALOG(R)File 155:MEDLINE(R)

12545842 PMID: 7882467
Improving active compression-decompression cardiopulmonary resuscitation **with an inspiratory impedance** valve .
Lurie K G ; Coffeen P; Shultz J; McKnite S; Detloff B; Mulligan K
Cardiac Arrhythmia Center, University of Minnesota, Minneapolis.
Circulation (UNITED STATES) Mar 15 **1995** , 91 (6) p1629-32, ISSN 0009-7322 Journal Code: 0147763
Document type: Journal Article
Languages: ENGLISH
Main Citation Owner: NLM
Record type: Completed

Improving active compression-decompression cardiopulmonary resuscitation **with an inspiratory impedance** valve .
Lurie K G ; Coffeen P; Shultz J; McKnite S; Detloff B; Mulligan K
Mar 15 **1995** ,
BACKGROUND: Active compression-decompression (ACD) cardiopulmonary **resuscitation** (**CPR**) has recently been demonstrated to provide significantly more blood flow to vital organs during cardiac...

... the hypothesis that intermittent impedance to inspiratory gas exchange during the decompression phase of ACD **CPR** enhances vital organ blood flow. METHODS AND RESULTS: ACD **CPR** was performed with a pneumatically driven automated compression-decompression device in a porcine model of ventricular fibrillation (VF). Nine pigs were randomized to receive ACD **CPR** alone, while 8 pigs received ACD **CPR** plus intermittent impedance to

inspiratory gas exchange with a threshold **valve** set to 40 cm H2O. Results comparing 2 minutes of ACD **CPR** alone versus ACD **CPR** with the inspiratory impedance threshold **valve** (ITV) revealed significantly higher mean (+/- SEM) coronary perfusion pressures (diastolic aortic minus diastolic right atrial pressures) in the ITV (31.0 +/- 2.3 mm Hg) group versus with ACD **CPR** alone (21 +/- 3.6 mm Hg) (P < .05). Total left ventricular and cerebral blood flows...

...77 +/- 0.095 and 0.47 +/- 0.06 mL/min per gram, respectively, with ACD **CPR** plus the ITV versus 0.45 +/- 0.1 and 0.32 +/- 0.016 mL/min per gram, respectively, with ACD **CPR** alone (P < .05). Similar improvements in the ITV group were observed after 7 minutes of ACD **CPR** . After 16 minutes of VF and 13 minutes of ACD **CPR** , 6 of 8 pigs in the ITV group were successfully **resuscitated** with less than three successive 150-J shocks, whereas only 2 of 9 pigs with ACD **CPR** alone were **resuscitated** with equivalent energy levels (P < .02). With up to three additional and successive 200-J shocks, all pigs in the ITV group and 7 of 9 pigs with ACD **CPR** alone were **resuscitated** (P = .18). CONCLUSIONS: Intermittent impedance to inspiratory flow of **respiratory** gases during ACD **CPR** significantly improves coronary perfusion pressures and vital organ blood flow and lowers defibrillation energy requirements...

Descriptors: Cardiopulmonary **Resuscitation** --methods--MT; *Heart Arrest --therapy--TH; Animals; Cardiopulmonary **Resuscitation** --instrumentation --IS; Heart Arrest--etiology--ET; Heart Arrest--physiopathology--PP; Pulmonary Gas Exchange; Regional Blood Flow; Swine; **Ventilation** -Perfusion Ratio; Ventricular Fibrillation--complications--CO; Ventricular Fibrillation--physiopathology--PP

7/3,K/4 (Item 4 from file: 155)

DIALOG(R)File 155:MEDLINE(R)

12320137 PMID: 12682493

Feasibility and effects of transcutaneous phrenic nerve stimulation combined with an inspiratory impedance threshold in a pig model of hemorrhagic shock.

Samniah Nemer; Voelckel Wolfgang G; **Zielinski Todd M** ; McKnite Scott; Patterson Robert; Benditt David G; **Lurie Keith G**

Cardiac Arrhythmia Center, Department of Medicine/Cardiovascular Division, University of Minnesota Medical School, MMC 508, AHC, 420 Delaware Street SE, Minneapolis, MN 55455, USA.

Critical care medicine (United States) Apr **2003** , 31 (4) p1197-202, ISSN 0090-3493 Journal Code: 0355501

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

Samniah Nemer; Voelckel Wolfgang G; **Zielinski Todd M** ; McKnite Scott; Patterson Robert; Benditt David G; **Lurie Keith G**

Apr **2003** ,

... rate of ten per minute while the airway was intermittently occluded with an inspiratory threshold **valve** between **positive pressure ventilations** . Hemodynamic variables were monitored for 30 mins. MEASUREMENTS AND MAIN RESULTS: Phrenic nerve stimulation in combination with the inspiratory threshold **valve** significantly (p <.001) improved right and left ventricular diameter compared with hypovolemic shock values by...

... 5% and 20 +/- 2.5%, respectively. Moreover, phrenic nerve stimulation together with the inspiratory threshold **valve** also increased transaortic, transpulmonary, and transmitral **valve** blood flow by 48 +/- 6.6%, 67 +/- 13.3, and 43 +/- 8.2%, respectively (p...

... Hg, respectively). CONCLUSIONS: This feasibility study suggests that phrenic nerve stimulation with the inspiratory threshold **valve** may improve cardiac preload and, subsequently, key hemodynamic variables in porcine model of severe hemorrhagic...

Descriptors: Cardiopulmonary **Resuscitation** --instrumentation--IS; *Phrenic Nerve; *Shock, Hemorrhagic--therapy--TH; *Transcutaneous Electric Nerve Stimulation; Animals; Combined Modality Therapy; Echocardiography, Transesophageal; Feasibility Studies; Hemodynamic Processes; **Respiratory** Mechanics; Shock, Hemorrhagic--physiopathology--PP; Swine

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7/3,K/5 (Item 5 from file: 155)

12215199 PMID: 12556262

Evaluation of a prototypic inspiratory impedance threshold valve **designed to enhance the efficiency of cardiopulmonary** resuscitation .

Lurie Keith G ; Barnes Thomas A; **Zielinski Todd M** ; McKnite Scott H
Cardiac Arrhythmia Center, Cardiovascular Division, Department of Medicine, University of Minnesota Medical School, Minneapolis 55455, USA. lurie002@tc.umn.edu.

Respiratory care (United States) Jan **2003** , 48 (1) p52-7, ISSN 0020-1324 Journal Code: 7510357
Document type: Journal Article
Languages: ENGLISH
Main Citation Owner: NLM
Record type: Completed

Evaluation of a prototypic inspiratory impedance threshold valve **designed to enhance the efficiency of cardiopulmonary** resuscitation .
Lurie Keith G ; Barnes Thomas A; **Zielinski Todd M** ; McKnite Scott H
Jan **2003** ,

OBJECTIVE: Assess a prototype inspiratory impedance threshold **valve** (ITV) designed to enhance vital organ circulation during standard and active compression/decompression cardiopulmonary **resuscitation** (**CPR**). BACKGROUND: The ITV attaches to commonly used airway assist devices and decreases intrathoracic pressure during the decompression (chest recoil) phase of **CPR** by creating a vacuum within the thorax, which increases venous blood flow to the heart...

... test was developed to determine the inspiratory impedance under various inspiratory flow conditions. RESULTS: The **valve** passed all minimum ASTM and ISO performance tests. During cardiac arrest in pigs the ITV...

... 2)O should be sufficient to decrease intrathoracic pressure during the decompression phase of standard **CPR** . Clinical studies are now underway.

Descriptors: Cardiopulmonary **Resuscitation** --instrumentation--IS; Animals; Cardiopulmonary **Resuscitation** --methods--MT; Equipment Design; Heart Arrest--therapy--TH; Swine

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7/3,K/6 (Item 6 from file: 155)

12145454 PMID: 12476879
Mechanical devices for cardiopulmonary resuscitation : **an update.**
Lurie Keith
Cardiac Arrhythmia Center, University of Minnesota, Box 508, 420 Delaware Street SE, Minneapolis, MN 55455, USA. lurie002@tc.umn.edu
Emergency medicine clinics of North America (United States) Nov **2002** , 20 (4) p771-84, ISSN 0733-8627 Journal Code: 8219565
Document type: Journal Article; Review; Review, Tutorial
Languages: ENGLISH
Main Citation Owner: NLM
Record type: Completed

Mechanical devices for cardiopulmonary resuscitation : **an update.**
Lurie Keith
Nov **2002** ,
... technique correctly have limited its overall effectiveness. This has prompted the development of newer lifesaving **CPR** techniques and devices. Some of the advances, such as the vest approach, active compression-decompression, and the impedance threshold **valve** , offer a benefit when compared with the Kouwenhoven technique. It is clear, however, that challenges...
... in the Kouwenhoven technique. Americans spend nearly $500,000,000 annually on this form of **CPR** training and retraining. Given the less than 5% survival rate for the 300,000 patients...

... benefits will be recognized and will lead to the adoption of more effective means to **resuscitate** patients.
Descriptors: Cardiopulmonary **Resuscitation** --instrumentation--IS

7/3,K/7 (Item 7 from file: 155)
DIALOG(R)File 155:MEDLINE(R)

12126281 PMID: 12456407
Vasopressor response in a porcine model of hypothermic cardiac arrest is improved with active compression-decompression cardiopulmonary resuscitation **using the inspiratory impedance threshold** valve .
Raedler Claus; Voelckel Wolfgang G; Wenzel Volker; Bahlmann Ludger; Baumeier Wolfgang; Schmittinger Christian A; Herff Holger; Krismer Anette C ; Lindner Karl H; **Lurie Keith G**
Department of Anesthesiology and Critical Care Medicine, Leopold-Franzens-University, Innsbruck, Austria. claus.raedler@uibk.ac.at
Anesthesia and analgesia (United States) Dec **2002** , 95 (6) p1496-502, table of contents, ISSN 0003-2999 Journal Code: 1310650
Document type: Journal Article
Languages: ENGLISH
Main Citation Owner: NLM
Record type: Completed

... **in a porcine model of hypothermic cardiac arrest is improved with active compression-decompression cardiopulmonary** resuscitation **using the inspiratory impedance threshold** valve .
...Bahlmann Ludger; Baumeier Wolfgang; Schmittinger Christian A; Herff Holger; Krismer Anette C; Lindner Karl H; **Lurie Keith G**
Dec **2002** ,
During normothermic cardiac arrest, a combination of active compression-decompression (ACD) cardiopulmonary **resuscitation** (**CPR**) with the inspiratory threshold **valve** (ITV) significantly improves vital

organ blood flow, but this technique has not been studied during hypothermic cardiac arrest. Accordingly, we evaluated the hemodynamic effects of ACD + ITV **CPR** before, and after, the administration of vasopressin in a porcine model of hypothermic cardiac arrest...

... After 10 min of untreated ventricular fibrillation, 14 animals were randomly assigned to either ACD **CPR** with the ITV (n = 7) or to standard (STD) **CPR** (n = 7). After 8 min of **CPR**, all animals received 0.4 U/kg vasopressin IV, and **CPR** was maintained for an additional 10 min in each group; defibrillation was attempted after 28 min of cardiac arrest, including 18 min of **CPR**. Before the administration of vasopressin, mean +/- SEM common carotid blood flow was significantly higher in the ACD + ITV group compared with STD **CPR** (67 +/- 13 versus 26 +/- 5 mL/min, respectively; P < 0.025). After vasopressin was given at minute 8 during **CPR**, mean +/- SEM coronary perfusion pressure was significantly higher in the ACD + ITV group, but did...

...seven animals in the ACD + ITV group versus none of seven animals in the STD **CPR** group (not significant). During hypothermic cardiac arrest, ACD **CPR** with the ITV improved common carotid blood flow compared with STD **CPR** alone. Moreover, after the administration of vasopressin, coronary perfusion pressure was significantly higher during ACD + ITV **CPR**, but not during STD **CPR**. IMPLICATIONS: New strategies are needed to improve the efficiency of cardiopulmonary **resuscitation** (**CPR**) in hypothermic cardiac arrest. Active compression-decompression **CPR** with the inspiratory threshold **valve** improved carotid blood flow (and coronary perfusion pressure with vasopressin) compared with standard **CPR**.

Descriptors: Cardiopulmonary **Resuscitation** --methods--MT; *Heart Arrest, Induced; *Hemodynamic Processes--drug effects--DE; *Vasopressins --pharmacology--PD

7/3,K/8 (Item 8 from file: 155)

DIALOG(R)File 155:MEDLINE(R)

11789514 PMID: 11975053

Bringing back the nearly dead. The hope and the challenge.

Lurie Keith

Cardiac Arrhythmia Center, University of Minnesota, USA.

Minnesota medicine (United States) Apr **2002**, 85 (4) p39-42, ISSN 0026-556X Journal Code: 8000173

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

Lurie Keith

Apr **2002**,

Despite widespread use of cardiopulmonary **resuscitation**, sudden cardiac arrest outside of a hospital setting results in death most of the time. Hoping to improve **resuscitation** outcomes, University of Minnesota researchers have focused their efforts on understanding cardiopulmonary physiology and improving **resuscitation** technologies and procedures. This article describes new technologies, designed to be used in conjunction with standard **CPR**, that promote recovery from cardiac arrest. Active compression-decompression **CPR**, which involves use of a suction cup device to draw more blood into the heart...

... the lungs, has been shown to double 1-year survival rates. The

inspiratory impedance threshold **valve** (ITV), when attached to an endotracheal tube or face mask, has been shown to increase...
Descriptors: Cardiopulmonary **Resuscitation** --mortality--MO; *Heart Arrest--mortality--MO; Cardiopulmonary **Resuscitation** --instrumentation--IS ; Equipment Design; Minnesota; Survival Rate; Treatment Outcome

7/3,K/9 **(Item 9 from file: 155)**
DIALOG(R)File 155:MEDLINE(R)

11761267 PMID: 11940794
Augmentation of ventricular preload during treatment of cardiovascular collapse and cardiac arrest.
Lurie Keith G ; **Zielinski Todd** ; Voelckel Wolfgang; McKnite Scott; Plaisance Patrick
Department of Medicine, Cardiovascular Division, Cardiac Arrhythmia Center, University of Minnesota, Minneapolis, MN, USA. lurie002@tc.umn.edu
Critical care medicine (United States) Apr **2002** , 30 (4 Suppl) pS162-5, ISSN 0090-3493 Journal Code: 0355501
Document type: Journal Article; Review; Review Literature
Languages: ENGLISH
Main Citation Owner: NLM
Record type: Completed

Lurie Keith G ; **Zielinski Todd** ; Voelckel Wolfgang; McKnite Scott; Plaisance Patrick
Apr **2002** ,
... heart during prolonged hypotension. This article describes the potential value of a new impedance threshold **valve** for the treatment of cardiac arrest and hypotension. The **valve** was designed to create a vacuum within the thorax during the decompression phase of cardiopulmonary **resuscitation** or during inhalation. By transiently blocking inspiratory gas exchange during the decompression phase of cardiopulmonary **resuscitation** , after phrenic nerve-stimulated gasping, or during spontaneous **ventilation** , the impedance- **valve** concept may have clinical value in the treatment of patients in cardiac arrest, hemorrhagic shock...
Descriptors: Cardiopulmonary **Resuscitation** --instrumentation--IS; *Heart Arrest--therapy--TH; *Hypotension--therapy--TH; Animals; Cardiopulmonary **Resuscitation** --methods--MT; Shock--therapy--TH

7/3,K/10 **(Item 10 from file: 155)**
DIALOG(R)File 155:MEDLINE(R)

11743363 PMID: 11919340
Effects of active compression-decompression cardiopulmonary resuscitation **with the inspiratory threshold** valve **in a young porcine model of cardiac arrest.**
Voelckel Wolfgang G; **Lurie Keith G** ; Sweeney Mike; McKnite Scott; **Zielinski Todd** ; Lindstrom Paul; Peterson Colleen; Wenzel Volker; Lindner Karl H
Cardiac Arrhythmia Center, Cardiovascular Division, Department of Medicine, University of Minnesota, Minneapolis, Minnesota, USA. wolfgang.voelckel@uibk.ac.at
Pediatric research (United States) Apr **2002** , 51 (4) p523-7, ISSN 0031-3998 Journal Code: 0100714
Document type: Journal Article
Languages: ENGLISH

Main Citation Owner: NLM
Record type: Completed

Effects of active compression-decompression cardiopulmonary resuscitation **with the inspiratory threshold** valve **in a young porcine model of cardiac arrest.**
Voelckel Wolfgang G; **Lurie Keith G** ; Sweeney Mike; McKnite Scott; **Zielinski Todd** ; Lindstrom Paul; Peterson Colleen; Wenzel Volker; Lindner Karl H
Apr **2002** ,
Active compression-decompression (ACD) cardiopulmonary **resuscitation** (**CPR**) with the inspiratory threshold **valve** (ITV) has been recently recommended by the American Heart Association for treatment of adults in...

... been used in a pediatric population. Thus, this study was designed to evaluate ACD + ITV **CPR** in a young porcine model of cardiac arrest. After 10 min of ventricular fibrillation, and 8 min of standard **CPR** , ACD + ITV **CPR** was performed in seven 4- to 6-wk-old pigs (8-12 kg); defibrillation was attempted 8 min later. Within 2 min after initiation of ACD + ITV **CPR** , mean (+/- SEM) coronary perfusion pressure increased from 18 +/- 2 to 24 +/- 3 mm Hg (p = 0.018). During standard versus ACD + ITV **CPR** , mean left ventricular myocardial and total cerebral blood flow was 59 +/- 21 versus 126 +/- 32...

... animals were successfully defibrillated, and survived >15 min. In conclusion, the combination of ACD + ITV **CPR** significantly increased both coronary perfusion pressure and vital organ blood flow after prolonged standard **CPR** in this young porcine model of ventricular fibrillation.
Descriptors: Cardiopulmonary **Resuscitation** ; *Heart Arrest--therapy--TH ; Adult; Animals; Blood Circulation; Blood Gas Analysis; Blood Pressure; Cardiopulmonary **Resuscitation** --instrumentation--IS; Cardiopulmonary **Resuscitation** --methods--MT; Disease Models, Animal; Swine

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7/3,K/11 (Item 11 from file: 155)
DIALOG(R)File 155:MEDLINE(R)
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11602706 PMID: 11772887
Use of an inspiratory impedance valve **improves neurologically intact survival in a porcine model of ventricular fibrillation.**
Lurie Keith G ; **Zielinski Todd** ; McKnite Scott; Aufderheide Tom; Voelckel Wolfgang
Cardiac Arrhythmia Center, Department of Medicine, University of Minnesota, Minneapolis 55455, USA. klurie@resqcpr.com
Circulation (United States) Jan 1 **2002** , 105 (1) p124-9, ISSN 1524-4539 Journal Code: 0147763
Contract/Grant No.: 1R43-HL-65851; HL; NHLBI
Document type: Journal Article
Languages: ENGLISH
Main Citation Owner: NLM
Record type: Completed

Use of an inspiratory impedance valve **improves neurologically intact survival in a porcine model of ventricular fibrillation.**
Lurie Keith G ; **Zielinski Todd** ; McKnite Scott; Aufderheide Tom; Voelckel Wolfgang
Jan 1 **2002** ,
BACKGROUND: This study evaluated the potential for an inspiratory impedance threshold **valve** (ITV) to improve 24-hour survival and

neurological function in a pig model of cardiac...

...neurological function. After 6 minutes of ventricular fibrillation (VF), followed by 6 minutes of cardiopulmonary **resuscitation** (**CPR**) with either a sham or an active **valve** , anesthetized pigs received 3 sequential 200-J shocks. If VF persisted, they received epinephrine (0.045 mg/kg), 90 seconds of **CPR** , and 3 more 200-J shocks. A total of 11 of 20 pigs (55%) in the sham versus 17 of 20 (85%) in the active **valve** group survived for 24 hours (P<0.05). Neurological scores were significantly higher with the active **valve** ; the cerebral performance score (1=normal, 5=brain death) was 2.2+/-0.2 with the sham ITV versus 1.4+/-0.2 with the active **valve** (P<0.05). A total of 1 of 11 in the sham versus 12 of 17 in the active **valve** group had completely normal neurological function (P<0.05). Peak end-tidal CO2 (PETCO2) values were significantly higher with the active **valve** (20.4+/-1.0) than the sham (16.8+/-1.5) (P<0.05). PETCO2...

... correlated with increased survival (P<0.05). CONCLUSIONS: Use of a functional ITV during standard **CPR** significantly improved 24-hour survival rates and neurological recovery. PETCO2 and systolic blood pressure were also significantly higher in the active **valve** group. These data support further evaluation of ITV during standard **CPR** .

Descriptors: Cardiopulmonary **Resuscitation** --instrumentation--IS; *Nervous System--physiopathology--PP; *Ventricular Fibrillation--therapy --TH...; mortality--MO; Heart Arrest--physiopathology--PP; Heart Arrest --therapy--TH; Hemodynamic Processes; Oxygen--blood--BL; **Respiratory** Mechanics; Swine; Treatment Outcome; Ventricular Fibrillation--mortality --MO; Ventricular Fibrillation--physiopathology--PP

7/3,K/12 (Item 12 from file: 155)
DIALOG(R)File 155:MEDLINE(R)

11427221 PMID: 11524335

Improving standard cardiopulmonary resuscitation **with an inspiratory impedance threshold** valve **in a porcine model of cardiac arrest.**

Lurie K G ; Voelckel W G; **Zielinski T** ; McKnite S; Lindstrom P; Peterson C; Wenzel V; Lindner K H; Samniah N; Benditt D
Department of Medicine, Cardiovascular Division, Cardiac Arrhythmia Center, University of Minnesota, Minneapolis 55455, USA. lurie002@tc.umn.edu

Anesthesia and analgesia (United States) Sep **2001** , 93 (3) p649-55, ISSN 0003-2999 Journal Code: 1310650
Document type: Journal Article
Languages: ENGLISH
Main Citation Owner: NLM
Record type: Completed

Improving standard cardiopulmonary resuscitation **with an inspiratory impedance threshold** valve **in a porcine model of cardiac arrest.**

Lurie K G ; Voelckel W G; **Zielinski T** ; McKnite S; Lindstrom P; Peterson C; Wenzel V; Lindner K H; Samniah N; Benditt

Sep **2001** ,
To improve the efficiency of standard cardiopulmonary **resuscitation** (**CPR**), we evaluated the potential value of impeding **respiratory** gas exchange selectively during the decompression phase of standard **CPR** in a porcine model of ventricular fibrillation. After 6 min of untreated cardiac arrest, anesthetized farm pigs weighing 30 kg were randomized to be treated with either standard **CPR** with a sham **valve** (n = 11) or standard **CPR** plus a functional inspiratory impedance threshold **valve** (ITV(TM)) (n =

11). Coronary perfusion pressure (CPP) (diastolic aortic minus right atrial pressure) was...

... primary endpoint. Vital organ blood flow was assessed with radiolabeled microspheres after 6 min of **CPR** , and defibrillation was attempted 11 min after starting **CPR** . After 2 min of **CPR** , mean +/- SEM CPP was 14 +/- 2 mm Hg with the sham **valve** versus 20 +/- 2 mm Hg in the ITV group ($P < 0.006$). Significantly higher CPPs were maintained throughout the study when the ITV was used. After 6 min of **CPR** , mean +/- SEM left ventricular and global cerebral blood flows were 0.10 +/- 0.03 and...

... of 11 in the ITV group (not significant). In conclusion, use of an inspiratory impedance **valve** during standard **CPR** resulted in a marked increase in CPP and vital organ blood flow after 6 min...
Descriptors: Cardiopulmonary **Resuscitation** --instrumentation--IS; *Heart Arrest--therapy--TH; * **Respiration** , Artificial--instrumentation--IS; Animals; Blood Gas Analysis; Hemodynamic Processes--physiology--PH; Regional Blood Flow--physiology--PH; **Respiratory** Mechanics--physiology --PH; Swine

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7/3,K/13 (Item 13 from file: 155)
DIALOG(R)File 155:MEDLINE(R)

11347587 PMID: 11436523
Mechanical advances in cardiopulmonary resuscitation .
Lurie K ; Plaisance P; Sukhum P; Soleil C
Cardiac Arrhythmia Center, Cardiovascular Division, Department of Medicine, University of Minnesota Medical School, Box 508, UM-AHC, 420 Delaware Street SE, Minneapolis, MN 55455, USA. lurie002@tc.umn.edu
Current opinion in critical care (United States) Jun **2001** , 7 (3) p170-5, ISSN 1070-5295 Journal Code: 9504454
Document type: Journal Article; Review; Review, Tutorial
Languages: ENGLISH
Main Citation Owner: NLM
Record type: Completed

Mechanical advances in cardiopulmonary resuscitation .
Lurie K ; Plaisance P; Sukhum P; Soleil C
Jun **2001** ,
... high mortality rates for patients in cardiac arrest, the American Heart Association and the European **Resuscitation** Council developed a new set of guidelines in 2000 to help advance several new and promising cardiopulmonary **resuscitation** (**CPR**) techniques and devices. This is the first time these organizations have taken such a bold...
... standard closed-chest cardiac massage. The new techniques, interposed abdominal counterpulsation and active compression decompression **CPR** , each provide greater blood flow to the vital organs in animal models of **CPR** and lead to higher blood pressures in patients in cardiac arrest. In some clinical studies...

...have resulted in a significant increase in survival after cardiac arrest in comparison with standard **CPR** . Three of the four new **CPR** devices that were recommended in the new guidelines also provide superior vital organ blood flow and increased blood pressures in comparison with standard **CPR** . The three devices that improve the efficiency of **CPR** are the circumferential vest, an active compression decompression **CPR** device, and an inspiratory impedance **valve** used in combination with the active compression decompression **CPR** device. The fourth device type, one that

compresses the thorax using an automated mechanical piston compression mechanism, was recommended to reduce the number of personnel required to perform **CPR** . However, no studies on the automated mechanical compression devices have showed an improvement in hemodynamic variables or survival in comparison with standard **CPR** . Taken together, these new technologies represent an important step forward in the evolution of **CPR** from a pair of hands to devices designed to enhance **CPR** efficiency. Each of these advances is described, and the recent literature about each of them...

Descriptors: Cardiopulmonary **Resuscitation** --instrumentation--IS; Cardiopulmonary **Resuscitation** --methods--MT; Cardiopulmonary **Resuscitation** --trends--TD; Efficiency; Equipment Design; Guidelines; United States

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7/3,K/14 (Item 14 from file: 155)

11233374 PMID: 11273935

The effects of positive **end-expiratory** pressure **during active compression decompression cardiopulmonary** resuscitation **with the inspiratory threshold** valve .

Voelckel W G; **Lurie K G** ; **Zielinski T** ; McKnite S; Plaisance P; Wenzel V; Lindner K H

Cardiac Arrhythmia Center, Cardiovascular Division, Department of Medicine, University of Minnesota, Minneapolis 55455, USA.

Anesthesia and analgesia (United States) Apr **2001** , 92 (4) p967-74, ISSN 0003-2999 Journal Code: 1310650

Document type: Journal Article

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

The effects of positive **end-expiratory** pressure **during active compression decompression cardiopulmonary** resuscitation **with the inspiratory threshold** valve .

Voelckel W G; **Lurie K G** ; **Zielinski T** ; McKnite S; Plaisance P; Wenzel V; Lindner K H

Apr **2001** ,

The use of an inspiratory impedance threshold **valve** (ITV) during active compression-decompression (ACD) cardiopulmonary **resuscitation** (**CPR**) improves perfusion pressures, and vital organ blood flow. We evaluated the effects of **positive** end-expiratory **pressure** (**PEEP**) on gas exchange, and coronary perfusion pressure gradients during ACD + ITV **CPR** in a porcine cardiac arrest model. All animals received pure oxygen intermittent **positive pressure ventilation** (IPPV) at a 5:1 compression-**ventilation** ratio during ACD + ITV **CPR** . After 8 min, pigs were randomized to further IPPV alone (n = 8), or IPPV with increasing levels of **PEEP** (n = 8) of 2.5, 5.0, 7.5, and 10 cm H(2)O...

...pressure decreased in the IPPV group from 150 +/- 30 at baseline after 8 min of **CPR** to 110 +/- 25 torr at 24 min, but increased in the **PEEP** group from 115 +/- 15 to 170 +/- 25 torr with increasing levels of **PEEP** (P <0.02 for comparisons within groups). Mean +/- SEM diastolic aortic minus diastolic left ventricular pressure gradient was significantly (P < 0.001) higher after the administration of **PEEP** (24 +/- 0 vs 17 +/- 1 mm Hg with 5 cm H(2)O of **PEEP** , and 26 +/- 0 vs 17 +/- 1 mm Hg with 10 cm H(2)O of **PEEP**), whereas the diastolic aortic minus right atrial pressure gradient (coronary perfusion pressure) was comparable between...

... aortic pressures were significantly (P < 0.05) higher with 10 cm H(2)O of **PEEP** when compared with IPPV alone (68 +/- 0 vs 59 +/- 2 mm Hg). In conclusion, when **CPR** was performed with devices designed to improve venous return to the chest, increasing **PEEP** levels improved oxygenation. Moreover, **PEEP** significantly increased the diastolic aortic minus left ventricular gradient and did not affect the decompression phase aortic minus right atrial pressure gradient. These data suggest that **PEEP** reduces alveolar collapse during ACD + ITV **CPR** , thus leading to an increase in indirect myocardial compression. IMPLICATIONS: Inspiratory impedance during active compression-decompression cardiopulmonary **resuscitation** improves perfusion pressures, and vital organ blood flow during cardiac arrest. Increasing levels of **positive** end-expiratory **pressure** during performance of active compression-decompression cardiopulmonary **resuscitation** with an inspiratory impedance **valve** improves oxygenation, and increases the diastolic aortic-left ventricular pressure gradient and systolic arterial blood...

Descriptors: Cardiopulmonary **Resuscitation** --instrumentation--IS; *Decompression--instrumentation--IS; * **Positive - Pressure Respiration** --instrumentation--IS

7/3,K/15 (Item 15 from file: 155)

11064292 PMID: 11098948

Improving the efficiency of cardiopulmonary resuscitation **with an inspiratory impedance threshold** valve .

Lurie K ; **Zielinski T** ; McKnite S; Sukhum P
Cardiac Arrhythmia Center, Cardiovascular Division, University of Minnesota, Minneapolis, USA. lurie@newcpr.com

Critical care medicine (UNITED STATES) Nov **2000** , 28 (11 Suppl) pN207-9, ISSN 0090-3493 Journal Code: 0355501
Document type: Journal Article
Languages: ENGLISH
Main Citation Owner: NLM
Record type: Completed

Improving the efficiency of cardiopulmonary resuscitation **with an inspiratory impedance threshold** valve .
Lurie K ; **Zielinski T** ; McKnite S; Sukhum P

Nov **2000** ,

In an effort to improve the efficiency of cardiopulmonary **resuscitation** (**CPR**), a new inspiratory impedance threshold **valve** has been developed to enhance the return of blood to the thorax during the chest decompression phase. This new device enhances **negative** intrathoracic **pressure** during chest wall recoil or the decompression phase, leading to improved vital organ perfusion during both standard **CPR** and active compression-decompression **CPR** . With active compression-decompression **CPR** , addition of the impedance threshold **valve** results in sustained diastolic pressures of >55 mm Hg in patients in cardiac arrest. The new **valve** shows promise for patients in asystole or shock refractory ventricular fibrillation, when enhanced return of...

...chest is needed to "prime the pump." The potential long-term benefits of this new **valve** remain under study.

Descriptors: Airway Resistance; *Cardiopulmonary **Resuscitation** --instrumentation--IS

7/3,K/16 (Item 16 from file: 155)
DIALOG(R)File 155:MEDLINE(R)

10709944 PMID: 10825624
Use of an inspiratory impedance threshold valve **during cardiopulmonary** resuscitation : **a progress report.**
Lurie K ; Voelckel W; Plaisance P; **Zielinski T** ; McKnite S; Kor D; Sugiyama A; Sukhum P
Cardiac Arrhythmia Center, Cardiovascular Division, University of Minnesota, Minneapolis 55455, USA. lurie002@tc.umn.edu
Resuscitation (IRELAND) May **2000** , 44 (3) p219-30, ISSN 0300-9572 Journal Code: 0332173
Document type: Journal Article; Review; Review, Tutorial
Languages: ENGLISH
Main Citation Owner: NLM
Record type: Completed

Use of an inspiratory impedance threshold valve **during cardiopulmonary** resuscitation : **a progress report.**
Lurie K ; Voelckel W; Plaisance P; **Zielinski T** ; McKnite S; Kor D; Sugiyama A; Sukhum P
May **2000** ,
Building upon studies on the mechanism of active compression-decompression (ACD) cardiopulmonary **resus**citation , a new inspiratory impedance threshold **valve** has been developed to enhance the return of blood to the thorax during the decompression phase of **CPR** . Use of this device results in a greater **negative** intrathoracic **pressure** during chest wall decompression. This leads to improved vital organ perfusion during both standard and ACD **CPR** . Animal and human studies suggest that this simple device increases cardiopulmonary circulation by harnessing more efficiently the kinetic energy of the outward movement of the chest wall during standard **CPR** or active chest wall decompression. When used in conjunction with ACD **CPR** during clinical evaluation, addition of the impedance **valve** resulted in sustained systolic pressures of greater than 100 mmHg and diastolic pressures of greater than 55 mmHg. The new **valve** may be beneficial in patients in asystole or shock refractory ventricular fibrillation, when enhanced return...

...chest is needed to 'prime the pump'. The potential long-term benefits of this new **valve** remain under investigation.
Descriptors: Airway Resistance; *Cardiopulmonary **Resuscitation** --instrumentation--IS

7/3,K/17 (Item 17 from file: 155)
DIALOG(R)File 155:MEDLINE(R)

10598623 PMID: 10704165
Inspiratory impedance during active compression-decompression cardiopulmonary resuscitation : **a randomized evaluation in patients in cardiac arrest.**
Plaisance P; **Lurie K G** ; Payen D
Department of Anesthesiology and Critical Care, Lariboisiere University Hospital, Paris, France. plaisance#claranet.fr
Circulation (UNITED STATES) Mar 7 **2000** , 101 (9) p989-94, ISSN 1524-4539 Journal Code: 0147763
Document type: Clinical Trial; Journal Article; Randomized Controlled Trial

Languages: ENGLISH
Main Citation Owner: NLM
Record type: Completed

Inspiratory impedance during active compression-decompression cardiopulmonary resuscitation : **a randomized evaluation in patients in cardiac arrest.**

Plaisance P; **Lurie K G** ; Payen D

Mar 7 **2000** ,

BACKGROUND: Blood pressure is severely reduced in patients in cardiac arrest receiving standard cardiopulmonary **resuscitation** (**CPR**). Although active compression-decompression (ACD) **CPR** improves acute hemodynamic parameters, arterial pressures remain suboptimal with this technique. We performed ACD **CPR** in patients with a new inspiratory threshold **valve** (ITV) to determine whether lowering intrathoracic pressures during the "relaxation" phase of ACD **CPR** would enhance venous blood return and overall **CPR** efficiency. METHODS AND RESULTS: This prospective, randomized, blinded trial was performed in prehospital mobile intensive care units in Paris, France. Patients in nontraumatic cardiac arrest received ACD **CPR** plus the ITV or ACD **CPR** alone for 30 minutes during advanced cardiac life support. End tidal CO(2) (ETCO(2...

...13.1+/-0.9, 25.0+/-1.4, and 36.5+/-1.5 with ACD **CPR** alone versus 19.1+/-1.0, 43.3+/-1.6, and 56.4+/-1.7 with ACD plus **valve** (P<0.001 between groups). ROSC was observed in 2 of 10 patients with ACD **CPR** alone after 26.5+/-0.7 minutes versus 4 of 11 patients with ACD **CPR** plus ITV after 19.8+/-2.8 minutes (P<0.05 for time from intubation to ROSC). Conclusions-Use of an inspiratory resistance **valve** in patients in cardiac arrest receiving ACD **CPR** increases the efficiency of **CPR** , leading to diastolic arterial pressures of >50 mm Hg. The long-term benefits of this new **CPR** technology are under investigation.

Descriptors: Airway Resistance; *Cardiopulmonary **Resuscitation** --methods --MT; *Heart Arrest--physiopathology--PP; *Heart Arrest--therapy--TH; * **Respiratory** Physiology...; Blood Circulation; Blood Pressure; Carbon Dioxide; Differential Threshold; Double-Blind Method; Middle Aged; Prospective Studies; **Respiration** ; Tidal Volume

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7/3,K/18 (Item 18 from file: 155)

DIALOG(R)File 155:MEDLINE(R)

10521636 PMID: 10625164

Utilization of a model lung system to assess the effects of an inspiratory impedance threshold valve **on the relationship between active decompression and intra-thoracic pressure.**

Sugiyama A; **Lurie K G** ; Maeda Y; Satoh Y; Imura M; Hashimoto K

Department of Pharmacology, Yamanashi Medical University, Nakakoma-gun, Japan. atsushis@res.yamanashi-med.ac.jp

Resuscitation (IRELAND) Nov **1999** , 42 (3) p231-4, ISSN 0300-9572 Journal Code: 0332173

Document type: Journal Article
Languages: ENGLISH
Main Citation Owner: NLM
Record type: Completed

Utilization of a model lung system to assess the effects of an inspiratory impedance threshold valve **on the relationship between active decompression and intra-thoracic pressure.**

Sugiyama A; **Lurie K G** ; Maeda Y; Satoh Y; Imura M; Hashimoto K
Nov **1999** ,

Use of an inspiratory impedance **valve** has recently been shown to increase the efficacy of standard and active compression-decompression cardiopulmonary **resuscitation** . We evaluated the effects of a prototypic impedance **valve** on the relationship between the active decompression and intra-thoracic pressure using a mechanical model lung system. Intermittent impedance to inspiratory flow of **respiratory** gases during the decompression phase of active compression-decompression cardiopulmonary **resuscitation** significantly decreased the intra-thoracic pressure, while the pressure was almost zero cm H2O during the cardiopulmonary **resuscitation** cycle when the impedance threshold **valve** was not functioning. Thus, this mechanical model will help in evaluating the **valve** as well as in optimizing its function by simulating various forms of lung disease.

Descriptors: Cardiopulmonary **Resuscitation** --methods--MT; *Lung --physiology--PH; Cardiopulmonary **Resuscitation** --instrumentation--IS; Models, Structural

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7/3,K/19 (Item 1 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

0014465073 BIOSIS NO.: 200300433792
Apparatus and methods for enhancing cardiopulmonary blood flow and ventilation
AUTHOR: **Lurie Keith G** (Reprint); **Zielinski Todd M**
JOURNAL: Official Gazette of the United States Patent and Trademark Office Patents 1273 (2): Aug. 12, 2003 **2003**
MEDIUM: e-file
PATENT NUMBER: US 6604523 PATENT DATE GRANTED: August 12, 2003 20030812
PATENT CLASSIFICATION: 128-20524 PATENT ASSIGNEE: CPRX LLC
PATENT COUNTRY: USA
ISSN: 0098-1133 (ISSN print)
DOCUMENT TYPE: Patent
RECORD TYPE: Abstract
LANGUAGE: English

Apparatus and methods for enhancing cardiopulmonary blood flow and ventilation
AUTHOR: **Lurie Keith G** ...

... **Zielinski Todd M**
2003

...ABSTRACT: and devices for increasing cardiopulmonary circulation induced by chest compression and decompression when performing cardiopulmonary **resuscitation** are provided. According to one method, a pressure responsive inflow **valve** is coupled to a patient's airway. Chest compressions and chest decompressions are performed. During chest decompression the inflow **valve** prevents **respiratory** gases from entering the lungs until a certain **negative** intrathoracic **pressure** level is exceeded at which time the one inflow **valve** opens. In this way, the inflow **valve** assists in increasing the magnitude and duration of **negative** intrathoracic **pressure** during decompression to enhance the amount of blood flow into the heart and lungs. Further, the patient is supplied with a pressurized **respiratory** gas through the inflow **valve** when the inflow **valve** opens to **ventilate** the patient.
DESCRIPTORS:

CHEMICALS & BIOCHEMICALS: **respiratory** gas
...METHODS & EQUIPMENT: cardiopulmonary **resuscitation** --...

...pressure responsive inflow **valve** --...

... **ventilation** enhancing apparatus...
... **ventilation** enhancing method

7/3,K/20 (Item 2 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

0014120814 BIOSIS NO.: 200300079533
Use of an impedance threshold valve **to treat hemorrhagic shock in spontaneously** breathing **pigs.**
AUTHOR: **Zielinski Todd M** (Reprint); **Lurie Keith G** (Reprint); McKnite Scott H (Reprint); Raedler Claus; Idris Ahamed; Voelckel Wolfgang
AUTHOR ADDRESS: Univ of Minnesota, Minneapolis, MN, USA**USA
JOURNAL: Circulation 106 (19 Supplement): pII.367 November 5, 2002 **2002**
MEDIUM: print
CONFERENCE/MEETING: Abstracts from Scientific Sessions Chicago, IL, USA November 17-20, 2002; 20021117
SPONSOR: American Heart Association
ISSN: 0009-7322 _(ISSN print)
DOCUMENT TYPE: Meeting; Meeting Abstract
RECORD TYPE: Citation
LANGUAGE: English

Use of an impedance threshold valve **to treat hemorrhagic shock in spontaneously** breathing **pigs.**
AUTHOR: **Zielinski Todd M** ...

... **Lurie Keith G**
2002
DESCRIPTORS:
...ORGANISMS: female, animal model, spontaneously **breathing**
METHODS & EQUIPMENT: impedance threshold **valve** --

7/3,K/21 (Item 3 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

0014119457 BIOSIS NO.: 200300078176
Standard CPR **versus active compression-decompression** CPR **with an impedance threshold** valve **in patients with out-of-hospital cardiac arrest.**
AUTHOR: Wolcke Benno B (Reprint); Mauer Dietmar K (Reprint); Schoefmann Mark F (Reprint); Teichmann Heinke (Reprint); Provo Terry A; Lindner Karl H; Dick Wolfgang F (Reprint); **Lurie Keith G**
AUTHOR ADDRESS: Clin of Anaesthesiology, Johannes Gutenberg-University, Mainz, Germany**Germany
JOURNAL: Circulation 106 (19 Supplement): pII-538 November 5, 2002 **2002**
MEDIUM: print
CONFERENCE/MEETING: Abstracts from Scientific Sessions Chicago, IL, USA November 17-20, 2002; 20021117
SPONSOR: American Heart Association
ISSN: 0009-7322 _(ISSN print)
DOCUMENT TYPE: Meeting; Meeting Abstract

RECORD TYPE: Citation
LANGUAGE: English

Standard CPR **versus active compression-decompression** CPR **with an impedance threshold** valve **in patients with out-of-hospital cardiac arrest.**
...AUTHOR: **Lurie Keith G**
2002
DESCRIPTORS:
METHODS & EQUIPMENT: cardiopulmonary pulmonary **resuscitation** {**CPR**}--

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7/3,K/22 (Item 4 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)
(c) 2004 BIOSIS. All rts. reserv.

0013883739 BIOSIS NO.: 200200477250
Automatic variable positive **expiratory** pressure valve **and methods**
AUTHOR: **Lurie Keith G** ; Voelckel Wolfgang (Reprint); **Zielinski Todd**
AUTHOR ADDRESS: Telfs, Austria**Austria
JOURNAL: Official Gazette of the United States Patent and Trademark Office Patents 1260 (5): July 30, 2002 **2002**
MEDIUM: e-file
PATENT NUMBER: US 6425393 PATENT DATE GRANTED: July 30, 2002 20020730
PATENT CLASSIFICATION: 128-20024 PATENT ASSIGNEE: CPRX LLC
PATENT COUNTRY: USA
ISSN: 0098-1133
DOCUMENT TYPE: Patent
RECORD TYPE: Abstract
LANGUAGE: English

Automatic variable positive **expiratory** pressure valve **and methods**
AUTHOR: **Lurie Keith G** ...

... **Zielinski Todd**
2002
ABSTRACT: The invention provides exemplary methods and **valves** used to alter a person's **breathing** . In one method, an exit **valve** is interfaced with a person's airway. The exit **valve** is configured such that **respiratory** gases are prevented from exiting the person's lungs when the exit **valve** is closed and are permitted to exit the person's lungs when the exit **valve** is opened. The exit **valve** is configured to open when a **valve** actuating pressure is met or exceeded. In a further step, the **valve** actuating pressure is varied over time.
DESCRIPTORS:
METHODS & EQUIPMENT: automatic variable **positive** expiratory **pressure valve** --...

... **breathing** altering methods

7/3,K/23 (Item 5 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)
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0013695044 BIOSIS NO.: 200200288555
Comparison of an active versus sham impedance threshold valve **on survival in patients receiving active compression decompression cardiopulmonary** resuscitation **for out-of-hospital cardiac arrest**
AUTHOR: Plaisance P (Reprint); **Lurie Keith** ; Ducros L; Soleil C; Payen D

AUTHOR ADDRESS: Lariboisiere Univ Hosp, Paris, France**France
JOURNAL: Circulation 104 (17 Supplement): pII.765 October 23, 2001 **2001**
MEDIUM: print
CONFERENCE/MEETING: Scientific Sessions 2001 of the American Heart Association Anaheim, California, USA November 11-14, 2001; 20011111
SPONSOR: American Heart Association
ISSN: 0009-7322
DOCUMENT TYPE: Meeting; Meeting Abstract
RECORD TYPE: Citation
LANGUAGE: English

Comparison of an active versus sham impedance threshold valve **on survival in patients receiving active compression decompression cardiopulmonary** resuscitation **for out-of-hospital cardiac arrest**
...AUTHOR: **Lurie Keith**
2001
DESCRIPTORS:
METHODS & EQUIPMENT: active compression decompression cardiopulmonary **resuscitation** --...

...active impedance threshold **valve** --...

...inspiratory impedance threshold **valve** --

7/3,K/24 (Item 6 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

0013495822 BIOSIS NO.: 200200089333
CPR **device having** valve **for increasing the duration and magnitude of** negative **intrathoracic** pressures
AUTHOR: **Lurie K G** ; Sweeney M; Gold B
AUTHOR ADDRESS: Minneapolis, Minn., USA**USA
JOURNAL: Official Gazette of the United States Patent and Trademark Office Patents 1205 (1): p101 Dec. 2, 1997 **1997**
MEDIUM: print
PATENT NUMBER: US 5692498 PATENT DATE GRANTED: Dec. 2, 1997 19971202
PATENT CLASSIFICATION: 128-205.24 PATENT ASSIGNEE: CPRX, INC.
PATENT COUNTRY: USA
ISSN: 0098-1133
DOCUMENT TYPE: Patent
RECORD TYPE: Citation
LANGUAGE: English

CPR **device having** valve **for increasing the duration and magnitude of** negative **intrathoracic** pressures
AUTHOR: **Lurie K G** ...
1997
DESCRIPTORS:
...MAJOR CONCEPTS: **Respiratory** System...

... **Respiration**
MISCELLANEOUS TERMS: CARDIOPULMONARY **RESUSCITATION** ; ...

... **CPR** ; ...

... **VALVING** SYSTEM

7/3,K/25 (Item 7 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

0012809662 BIOSIS NO.: 200000527975
Apparatus and methods for assisting cardiopulmonary resuscitation
AUTHOR: **Lurie Keith G** ; Sweeney Michael (Reprint); Gold Barbara
AUTHOR ADDRESS: St. Paul, MN, USA**USA
JOURNAL: Official Gazette of the United States Patent and Trademark Office Patents 1234 (3): May 16, 2000 **2000**
MEDIUM: e-file
PATENT NUMBER: US 6062219 PATENT DATE GRANTED: May 16, 2000 20000516
PATENT CLASSIFICATION: 128-20524 PATENT ASSIGNEE: CPRX LLC
PATENT COUNTRY: USA
ISSN: 0098-1133
DOCUMENT TYPE: Patent
RECORD TYPE: Abstract
LANGUAGE: English

Apparatus and methods for assisting cardiopulmonary resuscitation
AUTHOR: **Lurie Keith G** ...
2000

...ABSTRACT: and devices for increasing cardiopulmonary circulation induced by chest compression and decompression when performing cardiopulmonary **resuscitation** are provided. Cardiopulmonary circulation is increased according to the invention by impeding airflow into a patient's lungs to enhance the extent and duration of **negative** intrathoracic **pressure** during decompression of the patient's chest. Enhanced extent and duration of **negative** of intrathoracic **pressure** thus promotes venous blood flow into the heart and lungs from the peripheral venous vasculature...

...one embodiment, impeding the airflow into the patient's lungs is accomplished by placing a **ventilation** tube in the patient's airway. The **ventilation** tube contains either a flow restrictive orifice disposed within or connected in series with a lumen of the **ventilation** tube, or a pressure-responsive **valve** within a lumen of the tube to impede the inflow of air. In a preferred...
DESCRIPTORS:
...ORGANISMS: PARTS ETC: **respiratory** system
METHODS & EQUIPMENT: cardiopulmonary **resuscitation** { **CPR** }--

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7/3,K/26 (Item 8 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

0012672778 BIOSIS NO.: 200000391091
Heart failure mask and methods for increasing negative **intrathoracic** pressures
AUTHOR: **Lurie Keith G** (Reprint
AUTHOR ADDRESS: Minneapolis, MN, USA**USA
JOURNAL: Official Gazette of the United States Patent and Trademark Office Patents 1231 (5): Feb. 29, 2000 **2000**
MEDIUM: e-file
PATENT NUMBER: US 6029667 PATENT DATE GRANTED: February 29, 2000 20000229
PATENT CLASSIFICATION: 128-20716 PATENT ASSIGNEE: CPRX LLC, Minneapolis, MN, USA PATENT COUNTRY: USA
ISSN: 0098-1133
DOCUMENT TYPE: Patent

RECORD TYPE: Abstract
LANGUAGE: English

Heart failure mask and methods for increasing negative **intrathoracic** pressures
AUTHOR: **Lurie Keith G ...**
2000

...ABSTRACT: around the patient's mouth and nose, with the mask including a one-way expiration **valve** and an inspiratory threshold **valve** . The threshold **valve** is biased to open when a threshold pressure within the mask is in the range...

...3 cm H2 O to about -25 cm H2 O. With this arrangement, the patient **breathes** while the mask is sealed to the face, with the **respiratory** gasses being prevented from entering the patient's lungs during inhalation until the patient produces...

...3 cm H2 O to about -25 cm H2 O. At this point, the inspiratory **valve** opens to allow **respiratory** gasses into the lungs.
DESCRIPTORS:
...METHODS & EQUIPMENT: increasing **negative** intrathoracic **pressures** , therapeutic method

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7/3,K/27 (Item 9 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

0012299681 BIOSIS NO.: 200000017994
The pneumatic pump mechanism of cardiopulmonary resuscitation
AUTHOR: Voelckel Wolfgang G (Reprint); **Lurie Keith G** (Reprint
AUTHOR ADDRESS: Cardiac Arrhythmia Ctr, Univ of Minnesota, Minneapolis, MN, USA**USA
JOURNAL: Circulation 100 (18 SUPPL.): pI.663 Nov. 2, 1999 **1999**
MEDIUM: print
CONFERENCE/MEETING: 72nd Scientific Sessions of the American Heart Association Atlanta, Georgia, USA November 7-10, 1999; 19991107
ISSN: 0009-7322
DOCUMENT TYPE: Meeting; Meeting Abstract
RECORD TYPE: Citation
LANGUAGE: English

The pneumatic pump mechanism of cardiopulmonary resuscitation
...AUTHOR: **Lurie Keith G**
1999
DESCRIPTORS:
METHODS & EQUIPMENT: active compression-decompression cardiopulmonary **resuscitation** --...
...cardiopulmonary **resuscitation** --...

...inspiratory impedance threshold **valve** --
MISCELLANEOUS TERMS: ... **positive** end expiratory **pressure** --

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7/3,K/28 (Item 10 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

0012252387 BIOSIS NO.: 199900512047

Improving active compression decompression cardiopulmonary resuscitation **with an impedance threshold** valve **in patients in cardiac arrest**
AUTHOR: Plaisance Patrick (Reprint); Payan Didier (Reprint); **Lurie Keith G**

AUTHOR ADDRESS: Lariboisiere Univ. Hosp., Paris, France**France
JOURNAL: Circulation 98 (17 SUPPL.): pI477 Oct. 27, 1998 **1998**
MEDIUM: print
CONFERENCE/MEETING: 71st Scientific Sessions of the American Heart Association Dallas, Texas, USA November 8-11, 1998; 19981108
SPONSOR: The American Heart Association
ISSN: 0009-7322
DOCUMENT TYPE: Meeting; Meeting Abstract
RECORD TYPE: Citation
LANGUAGE: English

Improving active compression decompression cardiopulmonary resuscitation **with an impedance threshold** valve **in patients in cardiac arrest**
...AUTHOR: **Lurie Keith G**
1998
DESCRIPTORS:
METHODS & EQUIPMENT: active compression decompression cardiopulmonary **resuscitation** --...

...impedance threshold **valve** --

7/3,K/29 (Item 11 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)
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0011222963 BIOSIS NO.: 199800017210
Optimizing standard cardiopulmonary resuscitation **with an inspiratory impedance threshold** valve
AUTHOR: Mulligan Katherine A (Reprint); **Lurie Keith G** (Reprint); McKnite Scott H (Reprint); Detloff Barry L S (Reprint); Lindstrom Paul J (Reprint); Lindner Karl H
AUTHOR ADDRESS: Univ. Minn., Minneapolis, MN, USA**USA
JOURNAL: Circulation 96 (8 SUPPL.): pI365 10/21/97 **1997**
MEDIUM: print
CONFERENCE/MEETING: 70th Scientific Sessions of the American Heart Association Orlando, Florida, USA November 9-12, 1997; 19971109
ISSN: 0009-7322
DOCUMENT TYPE: Meeting; Meeting Abstract
RECORD TYPE: Citation
LANGUAGE: English

Optimizing standard cardiopulmonary resuscitation **with an inspiratory impedance threshold** valve
...AUTHOR: **Lurie Keith G**
1997
DESCRIPTORS:
METHODS & EQUIPMENT: cardiopulmonary **resuscitation** --...

...inspiratory impedance threshold **valve** , therapeutic method

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7/3,K/30 (Item 12 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)
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0010118284 BIOSIS NO.: 199698586117
Optimizing cardiopulmonary resuscitation **with an inspiratory threshold** valve
AUTHOR: **Lurie Keith G** ; Shultz Jeffery; Coffeen Paul; McKnite Katherine Mulligan Scot; Detloff Barry; Lugtu Carlos; Lindstrom Paul
AUTHOR ADDRESS: Univ. Minn., Minneapolis, MN, USA**USA
JOURNAL: Circulation 92 (8 SUPPL.): pI760 1995 **1995**
CONFERENCE/MEETING: 68th Scientific Session of the American Heart Association Anaheim, California, USA November 13-16, 1995; 19951113
ISSN: 0009-7322
DOCUMENT TYPE: Meeting; Meeting Abstract
RECORD TYPE: Citation
LANGUAGE: English

Optimizing cardiopulmonary resuscitation **with an inspiratory threshold** valve
AUTHOR: **Lurie Keith G** ...
1995
DESCRIPTORS:
...MAJOR CONCEPTS: **Respiratory** System...

... **Respiration**

7/3,K/31 (Item 13 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

0009934868 BIOSIS NO.: 199598402701
Histopathological changes in the right ventricle and their relation to pulmonary haemodynamics in patients with mitral valve **stenosis**
AUTHOR: **Zielinski Tomasz** (Reprint); Wasiutynski Aleksander; Korewicki Jerzy; Rajecka Aldona; Pogorzelska Hanna; Fiejka Elzbieta; Kotlinski Zbigniew; Biederman Andrzej
AUTHOR ADDRESS: 2nd Dep. Valvular Heart Diseases, Inst. Cardiol., Alpejska str. 42, 04-628 Warsaw, Poland**Poland
JOURNAL: Cor et Vasa 37 (2): p92-98 1995 **1995**
ISSN: 0010-8650
DOCUMENT TYPE: Article
RECORD TYPE: Citation
LANGUAGE: English

...**changes in the right ventricle and their relation to pulmonary haemodynamics in patients with mitral** valve **stenosis**
AUTHOR: **Zielinski Tomasz** ...
1995
DESCRIPTORS:
...MAJOR CONCEPTS: **Respiratory** System...

... **Respiration** ;

7/3,K/32 (Item 14 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

0009817825 BIOSIS NO.: 199598285658
Prognostic significance of changes in the compliance of the pulmonary venous system after isosorbide dinitrate in patients with mitral stenosis
AUTHOR: Pogorzelska Hanna (Reprint); Korewicki Jerzy; **Zielinski Tomasz** ;

Rajecka Aldona; Biederman Andrzej
AUTHOR ADDRESS: 2nd Dep. Heart Valve Disease, Natl. Inst. Cardiol., ul. Alpejska 42, 04-628 Warsaw, Poland**Poland
JOURNAL: International Journal of Cardiology 49 (1): p9-15 1995 **1995**
ISSN: 0167-5273
DOCUMENT TYPE: Article
RECORD TYPE: Abstract
LANGUAGE: English

...AUTHOR: **Zielinski Tomasz**
1995

...ABSTRACT: severe pulmonary hypertension. This condition can also influence the clinical and hemodynamic outcome of mitral **valve** replacement (MVR). This study has been aimed at assessing whether changes in the pulmonary venous...
DESCRIPTORS:
...MAJOR CONCEPTS: **Respiratory** System...

... **Respiration**

7/3,K/33 (Item 1 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

12188616 Genuine Article#: 739JG No. References: 18
Title: Comparison of standard cardiopulmonary resuscitation **versus the combination of active compression-decompression cardiopulmonary** resuscitation **and an inspiratory impedance threshold device for out-of-hospital cardiac arrest**
Author(s): Wolcke BB; Mauer DK; Schoefmann MF; Teichmann H; Provo TA; Lindner KH; Dick WF; Aeppli D; **Lurie KG (REPRINT)**
Corporate Source: Box 508,UMHC,420 Delaware St SE/Minneapolis//MN/55455 (REPRINT); Univ Mainz,Sch Med, Anesthesiol Clin,D-6500 Mainz//Germany/; Leopold Franzens Inst,Dept Anesthesia & Intens Care Med,Innsbruck//Austria/; Adv Circulatory Syst Inc,Eden Prairie//MN/; Univ Minnesota,Div Biostat,Minneapolis//MN/; Univ Minnesota,Sch Publ Hlth,Minneapolis//MN/; Univ Minnesota,Dept Emergency Med,Minneapolis//MN/; Hennepin Cty Med Ctr,Minneapolis//MN/55415
Journal: CIRCULATION, **2003** , V108, N18 (NOV 4), P2201-2205
ISSN: 0009-7322 Publication date: 20031104
Publisher: LIPPINCOTT WILLIAMS & WILKINS, 530 WALNUT ST, PHILADELPHIA, PA 19106-3621 USA
Language: English Document Type: ARTICLE (ABSTRACT AVAILABLE)

Title: Comparison of standard cardiopulmonary resuscitation **versus the combination of active compression-decompression cardiopulmonary** resuscitation **and an inspiratory impedance threshold device for out-of-hospital cardiac arrest**
...Author(s): BB; Mauer DK; Schoefmann MF; Teichmann H; Provo TA; Lindner KH; Dick WF; Aeppli D; **Lurie KG (REPRINT)**
, **2003**
Abstract: Background-Active compression-decompression (ACD) **CPR** combined with an inspiratory impedance threshold device (ITD) improves vital organ blood flow during cardiac arrest. This study compared survival rates with ACD+ITD **CPR** versus standard manual **CPR** (S- **CPR**).

Methods and Results-A prospective, controlled trial was performed in Mainz, Germany, in which a...

...with out-of-hospital arrest of presumed cardiac pathogenesis were sequentially randomized to ACD+ITD **CPR** or S- **CPR** by the advanced life support team after intubation. Rescuers learned which method of **CPR** to use at the start of each work shift. The primary end point was 1-hour survival after a witnessed arrest. With ACD+ITD **CPR** (n=103), return of spontaneous circulation and 1- and 24-hour survival rates were 55%, 51%, and 37% versus 37%, 32%, and 22% with S- **CPR** (n=107) (P=0.016, 0.006, and 0.033, respectively). One- and 24-hour survival rates in witnessed arrests were 55% and 41% with ACD+ITD **CPR** versus 33% and 23% in control subjects (P=0.011 and 0.019), respectively. One ...

...patients with a witnessed arrest in ventricular fibrillation were 68% and 58% after ACD+ITD **CPR** versus 27% and 23% after S- **CPR** (P=0.002 and 0.009), respectively. Patients randomized greater than or equal to10 minutes after the call for help to the ACD+ITD **CPR** had a 3 times higher 1- hour survival rate than control subjects (P=0.002). Hospital discharge rates were 18% after ACD+ITD **CPR** versus 13% in control subjects (P=0.41). In witnessed arrests, overall neurological function trended higher with ACD+ITD **CPR** versus control subjects (P=0.07).

Conclusions-Compared with S- **CPR** , ACD+ITD **CPR** significantly improved short-term survival rates for patients with out-of-hospital cardiac arrest. Additional studies are needed to evaluate potential long-term benefits of ACD+ITD **CPR** .

...Identifiers--PORCINE MODEL; VENTRICULAR-FIBRILLATION; LIFE-SUPPORT; **VALVE**; HYPOTHERMIA; GUIDELINES; SURVIVAL

7/3,K/34 (Item 2 from file: 34)

DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
(c) 2004 Inst for Sci Info. All rts. reserv.

10362478 Genuine Article#: 505PJ No. References: 0

Title: Measurement of intrathoracic pressures during basic and advanced cardiac life support while performing active compression decompression cardiopulmonary resuscitation **with an inspiratory impedance threshold** valve

Author(s): Plaisance P; Soleil C; Ducros L; **Lurie K** ; Vicaut E; Payen D
Corporate Source: Lariboisiere Univ Hosp,Paris//France/; CPRx LLC,Minneapolis//MN/
Journal: CRITICAL CARE MEDICINE, **2001** , V29, N12,S (DEC), PA73-A73
ISSN: 0090-3493 Publication date: 20011200
Publisher: LIPPINCOTT WILLIAMS & WILKINS, 530 WALNUT ST, PHILADELPHIA, PA 19106-3621 USA
Language: English Document Type: MEETING ABSTRACT

...**Title: intrathoracic pressures during basic and advanced cardiac life support while performing active compression decompression cardiopulmonary** resuscitation **with an inspiratory impedance threshold** valve

Author(s): Plaisance P; Soleil C; Ducros L; **Lurie K** ; Vicaut E; Payen D
, **2001**

7/3,K/35 (Item 3 from file: 34)

DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
(c) 2004 Inst for Sci Info. All rts. reserv.

10362418 Genuine Article#: 505PJ No. References: 0
Title: Use of an inspiratory impedance threshold valve **for rapid treatment of cardiovascular collapse secondary to heart shock in spontaneously** breathing **pigs**
Author(s): **Lurie K ; Zielinski T** ; McKnite S
Corporate Source: Univ Minnesota,Minneapolis//MN/55455
Journal: CRITICAL CARE MEDICINE, **2001** , V29, N12,S (DEC), PA55-A55
ISSN: 0090-3493 Publication date: 20011200
Publisher: LIPPINCOTT WILLIAMS & WILKINS, 530 WALNUT ST, PHILADELPHIA, PA 19106-3621 USA
Language: English Document Type: MEETING ABSTRACT

Title: Use of an inspiratory impedance threshold valve **for rapid treatment of cardiovascular collapse secondary to heart shock in spontaneously** breathing **pigs**
Author(s): **Lurie K ; Zielinski T** ; McKnite S
, **2001**

7/3,K/36 (Item 4 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

10362287 Genuine Article#: 505PJ No. References: 0
Title: Use of an inspiratory impedance threshold valve **for the rapid treatment of hemorrhagic shock in spontaneously** breathing **pigs**
Author(s): **Lurie K ; Zielinski T** ; McKnite S
Corporate Source: Univ Minnesota,Minneapolis//MN/55455
Journal: CRITICAL CARE MEDICINE, **2001** , V29, N12,S (DEC), PA13-A13
ISSN: 0090-3493 Publication date: 20011200
Publisher: LIPPINCOTT WILLIAMS & WILKINS, 530 WALNUT ST, PHILADELPHIA, PA 19106-3621 USA
Language: English Document Type: MEETING ABSTRACT

Title: Use of an inspiratory impedance threshold valve **for the rapid treatment of hemorrhagic shock in spontaneously** breathing **pigs**
Author(s): **Lurie K ; Zielinski T** ; McKnite S
, **2001**

7/3,K/37 (Item 5 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

09435208 Genuine Article#: 388ZD No. References: 0
Title: Active compression-decompression cardiopulmonary resuscitation **with the inspiratory threshold** valve **: A new concept for pediatric** resuscitation **?**
Author(s): Voelckel WG; **Lurie KG** ; Sweeney M; McKnite S; **Zielinski T** ; Lindstrom P; Peterson C; Wenzel V; Lindner KH
Corporate Source: Innsbruck Univ,A-6020 Innsbruck//Austria/; Univ Minnesota,Dept Med, Cardiac Arrhythmia Ctr,Minneapolis//MN/55455; Dept Anesthesiol,Minneapolis//MN/; Cardiac Arrhythmia Ctr,Minneapolis//MN/; Dept Anesthesiol & Intens Care Med,Innsbruck//Austria/
Journal: CRITICAL CARE MEDICINE, **2000** , V28, N12,S (DEC), PA65-A65
ISSN: 0090-3493 Publication date: 20001200
Publisher: LIPPINCOTT WILLIAMS & WILKINS, 530 WALNUT ST, PHILADELPHIA, PA 19106-3621 USA
Language: English Document Type: MEETING ABSTRACT

Title: **Active compression-decompression cardiopulmonary** resuscitation **with the inspiratory** threshold valve : **A new concept for pediatric** resuscitation ?
Author(s): Voelckel WG; **Lurie KG** ; Sweeney M; McKnite S; **Zielinski T** ; Lindstrom P; Peterson C; Wenzel V; Lindner KH
, **2000**

7/3,K/38 (Item 6 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

09294586 Genuine Article#: 367QE No. References: 0
Title: Improving standard CPR **with an inspiratory impedance threshold** valve
Author(s): **Lurie KG** ; Voelckel WG; **Zielinski TM** ; McKnite SH; Peterson C; Lindner KH; Benditt DG
Corporate Source: Univ Minnesota,Minneapolis//MN/; Leopold Franzens Univ,Innsbruck//Austria/
Journal: CIRCULATION, **2000** , V102, N18,S (OCT 31), P438-438
ISSN: 0009-7322 Publication date: 20001031
Publisher: LIPPINCOTT WILLIAMS & WILKINS, 530 WALNUT ST, PHILADELPHIA, PA 19106-3621 USA
Language: English Document Type: MEETING ABSTRACT

Title: Improving standard CPR **with an inspiratory impedance threshold** valve
Author(s): **Lurie KG** ; Voelckel WG; **Zielinski TM** ; McKnite SH; Peterson C; Lindner KH; Benditt DG
, **2000**

7/3,K/39 (Item 7 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

08385952 Genuine Article#: 276RX No. References: 0
Title: Effects of positive **end expiratory** pressure **on oxygenation and coronary perfusion pressure during ACD** CPR **with the inspiratory threshold** valve
Author(s): Voelckel WG; **Lurie KG** ; Plaisance P; Krismer AC; Wenzel V
Corporate Source: INNSBRUCK UNIV,/A-6020 INNSBRUCK//AUSTRIA/; UNIV MINNESOTA,/MINNEAPOLIS//MN/; LARIBOISIERE HOSP,/PARIS//FRANCE/
Journal: CRITICAL CARE MEDICINE, **1999** , V27, N12,S (DEC), P25-25
ISSN: 0090-3493 Publication date: 19991200
Publisher: LIPPINCOTT WILLIAMS & WILKINS, 530 WALNUT ST, PHILADELPHIA, PA 19106-3621
Language: English Document Type: MEETING ABSTRACT

Title: Effects of positive **end expiratory** pressure **on oxygenation and coronary perfusion pressure during ACD** CPR **with the inspiratory threshold** valve
Author(s): Voelckel WG; **Lurie KG** ; Plaisance P; Krismer AC; Wenzel V
, **1999**

7/3,K/40 (Item 1 from file: 73)
DIALOG(R)File 73:EMBASE

11287826 EMBASE No: 2001302000

Improving standard cardiopulmonary resuscitation **with an inspiratory impedance threshold** valve **in a porcine model of cardiac arrest**

Voelckel K.G.; Lurie W. G.; **Zielinski T.** ; McKnite S.; Lindstrom P.; Peterson C.; Wenzel V.; Lindner K.H.; Samniah N.; Benditt D.
Dr. K.G. Voelckel, Dept. of Med./Cardiovascular Div., University of Minnesota Med. Sch., MMC 508, 420 Delaware St. SE, Minneapolis, MN 55455 United States
AUTHOR EMAIL: lurie002@tc.umn.edu

Anesthesia and Analgesia (ANESTH. ANALG.) (United States) 2001, 93/3 (649-655)
CODEN: AACRA ISSN: 0003-2999
DOCUMENT TYPE: Journal ; Article
LANGUAGE: ENGLISH SUMMARY LANGUAGE: ENGLISH
NUMBER OF REFERENCES: 16

Improving standard cardiopulmonary resuscitation **with an inspiratory impedance threshold** valve **in a porcine model of cardiac arrest**
Voelckel K.G.; Lurie W. G.; **Zielinski T.** ; McKnite S.; Lindstrom P.; Peterson C.; Wenzel V.; Lindner K.H.; Samniah N.; Benditt...

To improve the efficiency of standard cardiopulmonary **resuscitation** (**CPR**), we evaluated the potential value ofimpeding **respiratory** gas exchange selectively during the decompression phase of standard **CPR** in a porcine modelof ventricular fibrillation. After 6 min of untreated cardiac arrest, anesthetized farm pigs weighing 30 kg were randomized to be treated with either standard **CPR** with asham **valve** (n = 11) or standard **CPR** plus a functional inspiratory impedance threshold **valve** (ITV(TM)) (n = 11).Coronary perfusion pressure (CPP) (diastolic aortic mius right atrial pressure) was...

...primary endpoint. Vital organ blood flow was assessed with radiolabeled microspheres after 6 min of **CPR** , and defibrillation was attempted 11 min after starting **CPR** . After 2 min of **CPR** , mean +/- SEM CPP was 14 +/- 2 mm Hg with the sham **valve** versus 20 +/- 2 mm Hg in the ITV group (P < 0.006). Significantly higher CPPs were maintained throughout the study when the ITV was used. After 6 min of **CPR** , mean +/-SEM left ventricular and global cerebral blood flows were 0.10 +/- 0.03 and...

...of 11 in the ITV group (not significant). In conclusion, use of an inspiratory impedance **valve** during standard **CPR** resulted in a marked increase in CPP and vital organ blood flow after 6 min...

MEDICAL DESCRIPTORS:
*heart arrest--therapy--th; * **resuscitation**
...gas exchange; heart ventricle fibrillation--therapy--th; coronary artery blood flow; defibrillation; treatment outcome; heart **valve** ; nonhuman; female; animal experiment; animal model; controlled study; article; priority journal
2001

7/3,K/41 (Item 2 from file: 73)
DIALOG(R)File 73:EMBASE

10915459 EMBASE No: 2000412772

Recent advances in active compression-decompression cardiopulmonary resuscitation

Sukhum P.; Voelckel W.; **Lurie K.G.**
Dr. K.G. Lurie, AHC, 420 Delaware St. SE, Minneapolis, MN 55455 United

States
Bailliere's Best Practice and Research in Clinical Anaesthesiology (BAILLIERE'S BEST PRACT. RES. CLIN. ANAESTHESIOL.) (United Kingdom) 2000 , 14/3 (483-496)
CODEN: BBPAF ISSN: 1521-6896
DOCUMENT TYPE: Journal; Review
LANGUAGE: ENGLISH SUMMARY LANGUAGE: ENGLISH
NUMBER OF REFERENCES: 26

Recent advances in active compression-decompression cardiopulmonary resuscitation
Sukhum P.; Voelckel W.; **Lurie K.G.**

...methods and devices have been developed to enhance the efficiency and efficacy of standard cardiopulmonary **resuscitation** (**CPR**). One new approach, active compression-decompression (ACD) **CPR** was developed to lower the intrathoracic pressure during the decompression phase of **CPR** , thereby enhancing venous blood return to the thorax. Over the past decade the ACD **CPR** device has been extensively evaluated in animals and humans. ACD **CPR** is the only new approach for improving **CPR** efficacy with a mechanical device that has achieved clinical relevance. More recently, an inspiratory impedance threshold **valve** (ITV(TM)) has been developed that causes a further reduction in intrathoracic pressures, augmenting the efficiency of both standard and ACD **CPR** . Consequently, ACD **CPR** and the impendance **valve** were recently recommended by the American Heart Association. Clinical trials are underway to determine the...
DEVICE BRAND NAME/MANUFACTURER NAME: ResQ- **Valve** /CPRxLLC/United States; ITV; Combitube
MEDICAL DESCRIPTORS:
* **resuscitation**
...therapy--dt; thorax pressure; venous return; cardiovascular equipment; biomedical technology assessment; staff training; medical education; **valve** ; compression; decompression; technique; cardiopulmonary hemodynamics; medical research; treatment outcome; biomedical engineering; review; priority journal
2000

7/3,K/42 (Item 3 from file: 73)
DIALOG(R)File 73:EMBASE

10777899 EMBASE No: 2000257951
Active compression-decompression cardiopulmonary resuscitation
Plaisance P.; Sukhum P.; **Lurie K.G.**
Dr. K.G. Lurie, Cardiac Arrhythmia Center, Department of Medicine, Univ. of Minnesota Medical School, 420 Delaware Street SE, Minneapolis, MN 55455 United States
AUTHOR EMAIL: lurie002@tc.umn.edu
Current Opinion in Critical Care (CURR. OPIN. CRIT. CARE) (United States) 2000, 6/3 (200-206)
CODEN: COCCF ISSN: 1070-5295
DOCUMENT TYPE: Journal; Review
LANGUAGE: ENGLISH SUMMARY LANGUAGE: ENGLISH
NUMBER OF REFERENCES: 51

Active compression-decompression cardiopulmonary resuscitation
Plaisance P.; Sukhum P.; **Lurie K.G.**

Despite the practice of standard closed-chest standard cardiopulmonary

resuscitation for more than four decades, survival rates for patients in cardiac arrest remain dismally low. In recent years, several new cardiopulmonary **resuscitation** (**CPR**) techniques and devices have been developed to improve upon the relative inefficiencies of standard **CPR** . One technique, active compression-decompression (ACD) **CPR** , is based upon the concept that lowering intrathoracic pressure during the **CPR** decompression phase enhances venous return by 'priming the pump' for the next compression phase. ACD **CPR** can significantly improve short- and long-term survival rates over standard **CPR** if performed by well-trained rescue personnel. Building upon ACD **CPR** , an inspiratory impedance threshold **valve** has more recently been developed that further decreases decompression phase intrathoracic pressure. The ITV(TM) and ACD **CPR** in combination provide even greater benefit over standard **CPR** or ACD **CPR** alone. These devices are becoming more widely accepted and used. (C) 2000 Lippincott Williams and...
MEDICAL DESCRIPTORS:
* **resuscitation** ; *survival rate
2000

7/3,K/43 (Item 4 from file: 73)
DIALOG(R)File 73:EMBASE

07054208 EMBASE No: 1997336052
M20: Recent advances in mechanical methods of cardiopulmonary resuscitation
Lurie K.G.
K.G. Lurie, Cardiac Arrhythmia Center, University of Minnesota, Minneapolis, MN United States
Acta Anaesthesiologica Scandinavica, Supplement (ACTA ANAESTHESIOL. SCAND. SUPPL.) (Denmark) 1997, 41/111 (49-52)
CODEN: AASXA ISSN: 0515-2720
DOCUMENT TYPE: Journal; Conference Paper
LANGUAGE: ENGLISH SUMMARY LANGUAGE: ENGLISH
NUMBER OF REFERENCES: 28

M20: Recent advances in mechanical methods of cardiopulmonary resuscitation
Lurie K.G.

Several new **CPR** techniques and devices have been developed and tested since the first report of manual closed-chested cardiopulmonary **resuscitation** (**CPR**) nearly four decades ago. These devices and techniques include vest **CPR** , interposed abdominal counterpulation **CPR** , active compression-decompression **CPR** , an impedance threshold **valve** , intra-aortic balloon pump and phased thoracic-abdominal counterpulsation. Many of these new mechanical advances...
MEDICAL DESCRIPTORS:
*intensive care; * **resuscitation**
artificial **ventilation** ; brain; conference paper; heart; human; priority journal
1997

7/3,K/44 (Item 1 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

01901217 ORDER NO: AADAA-I3058682

Evaluation of a phrenic nerve stimulator for the treatment of cardiac arrest and shock

Author: **Zielinski, Todd Michael**
Degree: Ph.D.
Year: **2002**
Corporate Source/Institution: University of Minnesota (0130)
Source: VOLUME 63/07-B OF DISSERTATION ABSTRACTS INTERNATIONAL. PAGE 3379. 71 PAGES
ISBN: 0-493-74125-9

Author: **Zielinski, Todd Michael**
Year: **2002**

...research work focuses on utilizing methods and devices to improve central venous return during cardiopulmonary **resuscitation** and/or traumatic injuries that suffer from hemorrhagic shock. The animal model used for this...

...optimal level of -10 to -15 mmHg by use of an impedance threshold **valve** (ITV™, CPRxLLC, Minneapolis, MN) that partially occludes the airway during the period of the...

...The application of this method produces a stimulated gasp during the decompression phase of cardiopulmonary **resuscitation** or during the expiratory gas exchange phase of the **respiratory** cycle (during **positive pressure ventilation**) under hemorrhagic shock conditions. In either situation, when the diaphragm is stimulated to contract, intrathoracic...

...out of the left ventricle to sustain or increase vital organ perfusion pressures during cardiopulmonary **resuscitation** or in patients suffering from hemorrhagic shock.

```
Set     Items   Description
S1         40   AU=(LURIE K? OR LURIE, K? OR MENK V? OR MENK, V? OR ZIELIN-
              SKI T? OR ZIELINSKI, T? OR BIONDI J? OR BIONDI, J?)
S2         34   KEITH(2W)LURIE OR VERN(2W)MENK OR TODD(2W)ZIELINSKI OR JAM-
              ES(2W)BIONDI
S3     633463   RESUSC? OR RESPIRAT? OR BREATH? OR VENTILAT? OR CPR OR PEEP
              OR (POSITIVE OR NEGATIVE)(2N)PRESSUR?
S4         33   S1:S2 AND S3
S5         33   S4 AND PY<2004
S6         23   RD (unique items)
? show files
File  16:Gale Group PROMT(R) 1990-2004/May 13
         (c) 2004 The Gale Group
File 160:Gale Group PROMT(R) 1972-1989
         (c) 1999 The Gale Group
File 148:Gale Group Trade & Industry DB 1976-2004/May 13
         (c)2004 The Gale Group
File 149:TGG Health&Wellness DB(SM) 1976-2004/May W1
         (c) 2004 The Gale Group
File 621:Gale Group New Prod.Annou.(R) 1985-2004/May 12
         (c) 2004 The Gale Group
File 444:New England Journal of Med. 1985-2004/May W2
         (c) 2004 Mass. Med. Soc.
File 441:ESPICOM Pharm&Med DEVICE NEWS 2004/May W2
         (c) 2004 ESPICOM Bus.Intell.
File 369:New Scientist 1994-2004/May W1
         (c) 2004 Reed Business Information Ltd.
File 370:Science 1996-1999/Jul W3
         (c) 1999 AAAS
File 129:PHIND(Archival) 1980-2004/May W1
         (c) 2004 PJB Publications, Ltd.
File 130:PHIND(Daily & Current) 2004/May 13
         (c) 2004 PJB Publications,Ltd.
File 135:NewsRx Weekly Reports 1995-2004/May W1
         (c) 2004 NewsRx
File  98:General Sci Abs/Full-Text 1984-2004/May
         (c) 2004 The HW Wilson Co.
File  15:ABI/Inform(R) 1971-2004/May 13
         (c) 2004 ProQuest Info&Learning
?
```

6/3,K/1 (Item 1 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)
(c) 2004 The Gale Group. All rts. reserv.

06068018 Supplier Number: 53533584 (USE FORMAT 7 FOR FULLTEXT)
ZOLL Medical Corp. Announces Election of New Director.
Business Wire, p1021
Jan 8, 1999
Language: English Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 376

(USE FORMAT 7 FOR FULLTEXT)
TEXT:
...Jan. 8, 1999--ZOLL Medical Corporation (Nasdaq:ZOLL) announced today that it has elected Dr. **James** W. **Biondi** to its Board of Directors.
... Officer and President since June, 1992. Cardiopulmonary Corp. designs, develops and assembles advanced software driven **ventilators** used for the treatment of anesthesia and intensive care patients. Dr. Biondi also currently serves...

...Company."
ZOLL Medical Corporation designs, manufactures and markets an integrated line of proprietary non-invasive **resuscitation** devices and disposable electrodes. Used by health care professionals to provide both types of cardiac **resuscitation** -- pacing and defibrillation--these products are essential in the emergency treatment of cardiac arrest victims
...
19990108

6/3,K/2 (Item 2 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)
(c) 2004 The Gale Group. All rts. reserv.

03384660 Supplier Number: 44698537
A HEART REVIVER, TANGLED IN RED TAPE
U.S. News & World Report, p19
May 23, 1994
Language: English Record Type: Abstract
Document Type: Magazine/Journal; General Trade

ABSTRACT:
The effectiveness of the Ambu CardioPump in **resuscitating** heart attack victims may be difficult to prove. The device is based on the design...

...was used 4 years ago to revive a man who collapsed of heart failure. Cardiologist **Keith** **Lurie** adapted the design for the Ambu CardioPump. Early data indicate that people treated with the...
19940523

6/3,K/3 (Item 3 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)
(c) 2004 The Gale Group. All rts. reserv.

01439495 Supplier Number: 41725634 (USE FORMAT 7 FOR FULLTEXT)
Health Talk: AMA says save the aspirin for the hangover
Drug Store News, v0, n0, pIP7
Dec 10, 1990

Language: English Record Type: Fulltext Abstract
Document Type: Magazine/Journal; Trade
Word Count: 257

... seems that toilet plungers may become a normal fixture in some households with heart patients.
Keith Lurie , M.D., of the University of California at San Francisco Medical Center reported a case...

...with a history of heart problems, collapsed at his home. His son, poorly trained in **CPR** , attempted to restore his father's **breathing** and pulse without success. He then grabbed a toilet plunger and used it to compress ...

...new technique: the mother had used the plunger on the man six months earlier to **resuscitate** him. Both times the man survived.
The son later suggested to physicians that toilet plungers...
19901210

6/3,K/4 (Item 1 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB

15357099 SUPPLIER NUMBER: 96414405 (USE FORMAT 7 OR 9 FOR FULL TEXT)
ZOLL and ResQSystems Sign Agreement to Commercialize Revolutionary New Device That Improves Cardiopulmonary Resuscitation -- CPR --.
Business Wire, 2140
Jan 14, 2003
LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 1072 LINE COUNT: 00094

ZOLL and ResQSystems Sign Agreement to Commercialize Revolutionary New Device That Improves Cardiopulmonary Resuscitation -- CPR --.
... WIRE)--Jan. 14, 2003
ZOLL Medical Corporation (Nasdaq: ZOLL), a manufacturer of non-invasive cardiac **resuscitation** devices, and ResQSystems Inc. a manufacturer of circulatory enhancement products, today announced that the companies...

...this unique device has shown improved circulation and increased blood flow to vital organs during **CPR** (cardio pulmonary **resuscitation**).
In connection with the distribution agreement, ZOLL made a $1,250,000 equity investment in...the distribution agreement, ZOLL has acquired exclusive rights to distribute the ResQPOD for the cardiac **resuscitation** market in the U.S., Canada and Europe. The ResQPOD is CE approved for sale...rate for victims of sudden cardiac arrest when used in conjunction with active compression/decompression **CPR** . Specifically, the ResQPOD increases blood flow to the heart and brain during **CPR** , which extends the window of ...patient's chance for complete neurological recovery. Studies are ongoing to demonstrate effectiveness during traditional **CPR** .
"The addition of the ResQPOD to our product line is an important step forward in...

...ResQSystems is an innovative company with a very solid foundation of clinical expertise in cardiac **resuscitation** . We are very optimistic about this partnership's ability to make a significant impact on cardiac **resuscitation** with the introduction of ...been recognized as the technical leader in devices that have revolutionized the field of cardiac

resuscitation , in both the pre-hospital and hospital markets. ZOLL's acceptance of the ResQPOD is an important endorsement of our technology," said **Keith** G. **Lurie** , M.D., Founder and Chief Executive of ResQSystems. "Their commitment and innovation is noteworthy and...in Burlington, MA, designs, manufactures and markets an integrated line of proprietary, non-invasive cardiac **resuscitation** devices and disposable electrodes. Used by health care professionals to provide both types of cardiac **resuscitation** - pacing and defibrillation - these products are essential in the emergency treatment of cardiac arrest victims...ZOLL, including the use of funds by ResQSystems, the impact of ResQPOD technology on cardiac **resuscitation** , ZOLL's ability to capitalize on existing relationships and other statements contained herein regarding matters...

20030114

6/3,K/5 **(Item 2 from file: 148)**
DIALOG(R)File 148:Gale Group Trade & Industry DB

15169899 SUPPLIER NUMBER: 94037745 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Draeger Medical and Cardiopulmonary Corp. Sign Exclusive Agreement for Distribution of Ventilator **Management System Throughout North America.**
Business Wire, 2017
Nov 7, 2002
LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 532 LINE COUNT: 00049

Draeger Medical and Cardiopulmonary Corp. Sign Exclusive Agreement for Distribution of Ventilator **Management System Throughout North America.**
... Nov. 7, 2002

Draeger Medical, Inc., a leading provider of medical systems and services for **ventilation** , and Cardiopulmonary Corp., a leading developer of **ventilator** management system software, announced that the companies have signed a distribution agreement providing Draeger Medical, Inc. with the exclusive right to sell Cardiopulmonary Corp.'s Bernoulli(TM) **Ventilator** Management System in Long Term Acute and Sub Acute Care markets throughout North America.

Christopher...Corp. will provide an encompassed solution for our customers, combining Draeger Medical's expertise in **ventilation** with Cardiopulmonary Corp.'s extensive knowledge of **ventilator** management systems. Together we can achieve our ambitious goals to grow within the Long Term...

...America. We are convinced that we found the best partner for a long, rewarding association."

James W. **Biondi** , M.D., Chief Executive Officer of Cardiopulmonary Corp., stated, "We are pleased to have Draeger Medical, a world class leader in critical care **ventilation** , as our partner for the distribution of the Bernoulli(TM) **Ventilator** Management System in the Long Term Acute and Sub Acute Care markets in North America. We look forward to a long, successful association in the distribution of our advanced **respiratory** management software and in the establishment of new standards of care in **ventilation** ."

About Cardiopulmonary Corp.

Cardiopulmonary Corp., located in Milford, Connecticut, is a leading developer of medical information technology for applied **respiratory** care. Cardiopulmonary develops, licenses, and markets the Bernoulli(TM) **Ventilator** Management System that provides continuous central station and remote wireless surveillance for most critical care and home care

ventilators . Cardiopulmonary is committed to the advancement of the state of the art for applied **respiratory** care by the introduction of superior technology to improve patient outcomes. For more information please...

20021107

6/3,K/6 (Item 3 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB

11317737 SUPPLIER NUMBER: 55660066
A comparison of standard cardiopulmonary resuscitation **and active compression-decompression** resuscitation **for out-of-hospital cardiac arrest.**
Plaisance, Patrick; **Lurie, Keith G.** ; Vicaut, Eric; Adnet, Frederic; Petit, Jean-Luc; Epain, Daniel; Ecollan, Patrick; Gruat, Renaud; Cavagna, Patrice; Biens, Jean; Payen, Didier
New England Journal of Medicine, 341, 8, 569(7)
August 19, 1999
ISSN: 0028-4793 LANGUAGE: English RECORD TYPE: Abstract

A comparison of standard cardiopulmonary resuscitation **and active compression-decompression** resuscitation **for out-of-hospital cardiac arrest.**
... **Lurie, Keith G**

ABSTRACT: People in cardiac arrest who receive active compression-decompression cardiopulmonary **resuscitation** (**CPR**) are more likely to survive than those who receive standard **CPR** . During active compression-decompression **CPR** , a hand-held suction device is used to raise the chest in between compressions. This...
...flow through the heart. Researchers randomly assigned 750 patients in cardiac arrest to receive standard **CPR** or active compression-decompression **CPR** . Those who received active compression-decompression **CPR** were twice as likely to be alive one year later and also more likely to...

DESCRIPTORS: **CPR** (First aid...
19990819

6/3,K/7 (Item 4 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB

09389643 SUPPLIER NUMBER: 19214231 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Randomised comparison of epinephrine and vasopressin in patients with out-of-hospital ventricular fibrillation.
Lindner, Karl H.; Dirks, Burkhard; Strohmenger, Hans-Ulrich; Prengel, Andreas W.; Lindner, Ingrid M.; **Lurie, Keith G.**
Lancet, v349, n9051, p535(3)
Feb 22, 1997
ISSN: 0099-5355 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 2368 LINE COUNT: 00205

... **Lurie, Keith** G.

ABSTRACT: Vasopressin may be better than epinephrine for **resuscitating** cardiac arrest patients for whom direct-current shock therapy is

ineffective. Of 40 patients who...
... in animals have suggested that intravenous vasopressin is associated with better vital-organ perfusion and **resuscitation** rates than is epinephrine in the treatment of cardiac arrest. We did a randomised comparison...

...primary drug therapy for cardiac arrest. The endpoints of this double-blind study were successful **resuscitation** (hospital admission), survival for 24 h, survival to hospital discharge, and neurological outcome (Glasgow coma...

...significantly larger proportion of patients treated with vasopressin than of those treated with epinephrine were **resuscitated** successfully from out-of-hospital ventricular fibrillation and survived for 24 h. Based upon these...

...pharmacological therapies have been examined. Interest in the possible value of vasopressin treatment during cardiopulmonary **resuscitation** arose after the observation that there is a large release of vasopressin immediately after a...

...standard treatment protocols, for advanced cardiac life support according to the guidelines of the European **Resuscitation** Council and the American Heart Association.1,2
Patients enrolled in this study lived in...

...physician specialising in emergency care.
Cardiac arrest was defined as the absence of both spontaneous **respiration** and palpable carotid pulse. Patients with cardiopulmonary arrest were included in the study if the...

...60-90 s after drug administration. If the study drug failed to restore spontaneous circulation, **resuscitation** was continued according to the standard guidelines.1,2 Patients remaining in cardiac arrest after...

...report.8 A study protocol check, by means of an onset tape recording of all **resuscitation** -related events, was made by a supplementary member of the rescue team. The call-response...

...of the accident. In witnessed cardiac arrests, the time from collapse to start of cardiopulmonary **resuscitation** was recorded. Restoration of spontaneous circulation was defined as the return of a spontaneous palpable ...

...Hg for an undefined period at any time after administration of the study drug). Successful **resuscitation** was defined as a return of spontaneous circulation, and on admission to hospital spontaneous circulation...

...Student's t test for continuous data. The primary endpoint of the study was successful **resuscitation** , defined as survival to intensive-care unit admission without the need for closed-chest cardiopulmonary **resuscitation** after return of spontaneous circulation. Before the study we calculated the sample size required based...

...detect with 80% probability, at a one-sided significance of 005, an increase in successful **resuscitation** rate from 30% with standard epinephrine treatment to 45%; the calculation indicated that 19 patients...

...remaining cases the medical history remained unclear. 63% of the arrests were witnessed, but cardiopulmonary **resuscitation** was initiated by a

bystander at the site of the incident in only 23% of...

...2). However, more patients in the vasopressin group than in the epinephrine group were successfully **resuscitated** (to hospital admission) and a significantly greater proportion survived for at least 24 h (table...

...without further advanced cardiac life support), there was a return of spontaneous circulation and successful **resuscitation** in two (10%) epinephrine-treated and seven (35%) vasopressin-treated patients ($p<0001$). Immediately after **resuscitation** and during the further clinical treatment, we observed no side-effects (such as sustained splanchnic...

...of those treated with vasopressin than those given epinephrine as the initial vasopressor during cardiopulmonary **resuscitation** and advanced cardiac life support survived for 24 h.

The results of this preliminary study...

...results from patients with refractory cardiac arrest in whom vasopressin was given when all other **resuscitation** efforts had failed.5 In that series of case reports, eight patients with in-hospital...

...no neurological deficit.

Our study had some limitations. Since no previous investigation of vasopressin for **resuscitation** of the fibrillating human heart was available, we used only one dose of vasopressin in...

...algorithm. At present, nothing is known about the pharmacokinetics of repeated vasopressin administration during cardiopulmonary **resuscitation** in human beings. Because of the lack of information, epinephrine was administered in the vasopressin...

...This study was supported by a grant from the Laerdal Foundation, Norway.

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19970222

6/3,K/8 (Item 5 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB

08715977 SUPPLIER NUMBER: 18297440 (USE FORMAT 7 OR 9 FOR FULL TEXT)
The Ontario trial of active compression-decompression cardiopulmonary resuscitation for in-hospital and prehospital cardiac arrest.
Stiell, Ian G.; Hebert, Paul C.; Wells, George A.; Laupacis, Andreas; Vandemheen, Katherine; Dreyer, Jonathan F.; Eisenhauer, Mary A.; Gibson, John; Higginson, Lyall A.J.; Kirby, Ann S.; Mahon, Jeffrey L.; Maloney, Justin P.; Weitzman, Brian N.
JAMA, The Journal of the American Medical Association, v275, n18, p1417(7)
May 8, 1996
ISSN: 0098-7484 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 5464 LINE COUNT: 00459

The Ontario trial of active compression-decompression cardiopulmonary resuscitation for in-hospital and prehospital cardiac arrest.

ABSTRACT: Active compression-decompression cardiopulmonary **resuscitation** (ACD **CPR**) does not appear to be more effective than regular **CPR** . During ACD **CPR** , the rescuer uses a suction device that allows the chest to expand, or decompress, following each compression. Research has suggested that this may improve blood flow and **ventilation** . Researchers followed 773 people who developed cardiac arrest in a hospital and 1,011 people...
...the community and were transported to a hospital. Approximately half of both groups received regular **CPR** and half received ACD **CPR** . ACD **CPR** did not improve survival rates at one hour or at hospital discharge. This was true...

...as age, type of arrhythmia that led to cardiac arrest or how soon they received **CPR** . Many of the rescuers found it very difficult to administer ACD **CPR** .
AUTHOR ABSTRACT: Objective. - To compare the impact of active compression-decompression (ACD) cardiopulmonary **resuscitation** (**CPR**) and standard **CPR** on the outcomes of in-hospital and prehospital victims of cardiac arrest. Design. - Randomized controlled...

...total of 1784 adults who had cardiac arrest. Intervention. - Patients received either standard or ACD **CPR** throughout **resuscitation** . Main Outcome Measures. - Survival for 1 hour and to hospital discharge and the modified Mini-Mental State Examination (MMSE). Results. - All characteristics were similar in the standard and ACD **CPR** groups for the 773 in-hospital patients and the 1011 prehospital patients. For in-hospital patients, there were no significant differences between the standard (n=368) and ACD (n=405) **CPR** groups in survival for 1 hour (35.1 % vs 34.6%; P=.89), in survival...
...there were also no significant differences between the standard (n=510) and ACD (n=501) **CPR** groups in survival for 1 hour (16.5% vs 18.2%; P=.48), in survival...

...of clinically important subgroups failed to identify any patients who appeared to benefit from ACD **CPR** . Conclusions. - ACD **CPR** did not improve survival or neurologic outcomes in any group of patients with cardiac arrest.

TEXT:

IN THE 35 YEARS since the introduction of closed-chest cardiopulmonary **resuscitation** **CPR**),(1) there has been much research into advanced cardiac life support (ACLS) measures.(2) Nevertheless...

...promptly respond to airway management and defibrillation.(3) Recent evaluations of pharmacologic therapy for cardiac **resuscitation** have been disappointing.(4) Consequently, there has been renewed interest in the development of new techniques for performing basic **CPR** .(5-7) One promising approach, active compression-decompression (ACD) **CPR** , involves a suction device that allows the rescuer to lift up and expand (decompress) the...

...9) The ACD device is commercially available in many countries and is frequently employed in **resuscitation** efforts for cardiac arrest.

Recent studies suggest increased myocardial and cerebral blood flow as well as increased **ventilation** in animal **resuscitated** with ACD **CPR** compared with standard **CPR** .(10-18) In human studies, researchers have also demonstrated significantly better hemodynamic responses and **ventilatory** profiles during ACD **CPR** .(19-25)

The most clinically important measures of benefit for cardiac arrest interventions are long...

...neurologic function determined in large, carefully conducted, randomized, controlled trials. Published clinical trials of ACD **CPR** used on patients who collapse outside the hospital have produce conflicting results.(26,27) Two small trial of in-hospital patients showed strong trends toward improved survival wit ACD **CPR** but lacked sufficient power to detect an important difference between groups.(28,29) This study was designed to compare the impact of ACD and standard **CPR** on the survival and neurologic outcomes of both in-hospital and prehospital victims of cardiac...

...the study if they had cardiac arrest and required chest compressions in the course of **resuscitation** . Included were patients who had cardiac arrest while in 1 of 5 tertiary care hospitals...

...age of 16 years; had a terminal illness; were known to have been without basic **CPR** for more than 15 minutes; had acute trauma or exsanguination; had a recent sternotomy; were...

...in the study during the same hospital admission; or were judged to have received inappropriate **CPR** (eg, **respiratory** arrest with detectable pulse).

Informed consent was not obtained, because of the urgency of the...

...the American Heart Association for basic cardiac life support and ACLS.(2) In-hospital basic **CPR** was provided by nurses, **respiratory** therapists, orderlies, and physicians, and ACLS was directed by staff physicians in emergency departments and by senior medical residents on wards. Patients who collapsed outside the hospital received basic **CPR** from citizen bystanders, first-responding firefighters or police officers, or ambulance officers; the latter transported...

...but not endotracheal intubation or intravenous therapy.

Patients were randomly assigned to receive either standard **CPR** or

ACD **CPR** according to the presence of a control dummy object or an ACD **CPR** de vice (Cardiopump, Ambu International A/S, Copenhagen, Denmark) in sealed containers available on cardiac...

...which depended by chance on the location of each cardiac arrest.

In-hospital staff (nurses, **respiratory** therapists, orderlies, and physicians) and prehospital staff (ambulance officers, firefighters, and police officers) were all fully trained in standard **CPR** and required regular testing. All staff were taught to perform ACD **CPR** during sessions that included lectures, videotapes, and practice with manikins. Competence was assessed by a...

...and update memos were distributed throughout the study, and research nurses monitored the performance of **CPR** whenever this was feasible. The study was preceded by a 1-month run-in period...

...randomization containers had the ACD device, to provide the staff with experience in performing ACD **CPR** and to test study procedures.

Outcome Measures

The primary outcome measure was successful 1resuscitation to survival for 1 hour, defined as the continuous presence of a spontaneous and measurable...
...the need for vasopressor or antiarrhythmic agents) for at least 1 hour from the time **CPR** was discontinued; such patients were usually stable enough to be admitted to the intensive care...

...grade 5, brain dead). Other outcomes assessed were the return of any detectable pulse during **resuscitation** , presence of injuries related to **CPR** , and problems with use of the ACD device noted by rescuers. Assessment of survival outcomes...

...chi.sup.2) test for difference in proportions and the following assumptions: baseline rate of **resuscitation** to survival for 1 hour, 30%; absolute difference in rate of survival for 1 hour...treat basis, ie, according to the randomization group rather than according to the type of **CPR** actually received. An interim analysis of survival with the O'Brien-Fleming technique of grouped...

...the hypothesis that there was no difference between study groups for the primary end point, **resuscitation** to survival for 1 hour. Similarly, (chi.sup.2) analysis was used to test the...

...Survival outcomes in clinically important a priori subgroups (based on initial cardiac rhythm, time to **CPR** , time from **CPR** to ACLS, duration of **CPR** , cause of the arrest, and age) were compared using (chi.sup.2) analysis or the...

...included in the model. Adjustment was made for the following variables: age, sex, time to **CPR** , time from **CPR** to ACLS, duration of **CPR** , witnessed vs unwitnessed arrest, cause, initial rhythm, current or past medical diagnoses of **respiratory** disease or ischemic heart disease, hospital, and treatment

RESULTS

During the study period, from June...

...Among the in-hospital patients, 82 were eligible but not randomized (33 Of whom were **resuscitated**), and among the prehospital patients 238 were eligible but not randomized (31 of whom were **resuscitated**). The urgency of cardiac arrest **resuscitation** combined with the need to have the ACD device readily available on each cardiac arrest...

...n=39, n=7), acute trauma (n=14, n=31), more than 15 minutes without **CPR** n=0, n=31), initially treated in nonstudy ambulance (n=0, n=21), prehospital patient randomized in hospital n=0, n=14), inappropriate **CPR** (n=13, n=0), sternotomy (n=7, n=0), terminal illness (n=4, n=6...
...4), and arrest in the recovery room n=2, n=0). For standard vs ACD **CPR**, respectively, the percentages of these ineligible patients who were **resuscitated** were 69% (53/77) vs 48% (26/54) in hospital and 5% (3/62) vs ...

...hospital and prehospital patients, demographic and medical characteristics were similar in the standard and ACD **CPR** groups (Table 1). Overall, the in-hospital patients differed from the prehospital patients with regard to sex, witnessed arrest, initial rhythm of pulseless electrical activity or asystole, **respiratory** cause, and most current diagnoses, as well as most time intervals and the frequency of administration of most **resuscitation** drugs.

For both in-hospital and prehospital patients, there was no difference between the standard and ACD **CPR** groups in the proportions **resuscitated** to survival for 1 hour or survival to hospital discharge (Table 2). For both the...

...the analysis. After multivariate adjustment, the odds ratios and 95% confidence intervals in the ACD **CPR** group (compared with the standard **CPR** group) were, among in-hospital patients, 1.01 (0.72-1.41) for survival for...
...both in-hospital and prehospital patients, there was no difference between the standard and ACD **CPR** groups in the neurologic status of the survivors as reflected by MMSE scores or cerebral performance categories (Table 3). There were no differences between the standard and ACD **CPR** groups in the percentage who had any return of pulse among in-hospital patients (52...

...visceral injuries documented by radiography or autopsy was not different between the standard and ACD **CPR** groups: 4% for both groups among in-hospital patients and 3% vs 2% among prehospital patients. Both in-hospital and prehospital **CPR** providers rated ACD **CPR** as difficult or very difficult to perform in 18% of cases and noted problems with...

...Difficulty in achieving adequate decompression was recorded for 59 (15%) of 405 in-hospital ACD **CPR** patients and for 86 (17%) of 501 prehospital ACD **CPR** patients.

In no clinically important a priori subgroup among either in-hospital or prehospital patients...

...for 1 hour or until hospital discharge better in the group randomized to receive ACD **CPR** (Table 4). A post hoe subgroup was created by excluding patients from the ACD **CPR** group who were rated by the providers to have had inadequate decompression. This analysis also revealed that there were no significant differences between the standard and ACD **CPR** groups either among in-hospital patients for survival for 1 hour (35% vs 37%; P...

...hospital discharge (4% vs 5%; P=.39). Finally, when assessed according to the type of **CPR** actually used rather than on an intention-to-treat basis, there were no significant differences...

...survival outcome among in-hospital or prehospital patients.

COMMENT

We found no improvements with ACD **CPR** in immediate or longer-term survival for patients with cardiac arrest who were treated either...

...outcome scales was no better in survivors of cardiac arrest who were treated by ACD **CPR** than in those treated by standard **CPR** . Further analysis of the data did not reveal any important subgroup of patients who appeared to benefit from ACD **CPR** , regardless of whether they were initially treated in or outside the hospital. Similarly, ACD CPR was shown to have no effect on survival after we controlled for possible confounding factors by multivariate analysis.

A substantial body of research supports the hypothesis that ACD **CPR** should be associated with improved survival. In animal models, ACD **CPR** has been shown to produce much better cardiovascular hemodynamic responses than standard **CPR** , including increased cerebral perfusion pressure, increased velocity time integral (an analogue of cardiac output), increased ...

...11,17) Furthermore, several investigators have demonstrated improved myocardial and cerebral blood flow with ACD **CPR** , while others have shown improved minute **ventilation** . (11,12,14-16,18) These researchers have speculated that the effectiveness of ACD **CPR** can be attributed to the "thoracic pump" theory of blood flow, whereby there is a generalized pressure increase in intrathoracic vessels during **CPR** compressions. (36,37) The **negative** intrathoracic **Pressure** associated with the decompression phase of ACD **CPR** may lead to greater venous return and more efficient ventricular filling, thus increasing stroke volume...

...humans, physiologic data from victims of cardiac arrest also indicate impressive hemodynamic improvements with ACD **CPR** compared with standard **CPR** . It appears that ACD **CPR** leads to increased aortic systolic blood pressure, increased end-tidal carbon dioxide levels, and increased coronary perfusion pressure.(19,21,23,25) Several investigators have shown that ACD **CPR** is associated with increased diastolic filling times, increased velocity time integral of transmitral flow, and...
...published clinical trials have shown strong trends toward better survival and neurologic outcomes with ACD **CPR** both in and outside the hospital. None of these studies had sufficient numbers of patients...

...St Paul, Minn, Lurie and colleagues(26) found strong trends toward better survival with ACD **CPR** and statistically better outcomes in those treated within 10 minutes. Schwab and associates(27) failed to find any improvement with ACD **CPR** in either Fresno, Calif (N=253), or San Francisco, Calif (N=607). Two smaller trials...

...as well as strong trends toward better survival to discharge in patients treated with ACD **CPR** .

Why did use of ACD **CPR** in our study fail to improve patient survival despite expectations that had been raised by...

...humans, particularly those with coronary artery disease. Kern and associates(48) have demonstrated that during **CPR** , myocardial blood flow below coronary lesions is substantially reduced and does not correlate well with...

...long-term survival. Interestingly, none of the animal studies that demonstrated hemodynamic responsiveness with ACD **CPR** assessed the impact on survival. One other investigator was unable to find even hemodynamic benefits with ACD **CPR** in an animal model.(50)

Could features of our study design have led to a failure to identify potential benefits of ACD **CPR** The randomization of patients with cardiac arrest can be challenging when the clinical situation is...might have led to a finding of clinically important improvement in outcomes for the ACD

CPR group, we believe this is unlikely. For both patient populations, the 95% confidence intervals of...

...rates suggest a maximum possible improvement of 3.5% in survival to discharge with ACD **CPR** . A systematic overview incorporating our results and those of the previous studies did not demonstrate an overall benefit for survival with ACD **CPR** either in or outside the hospital Figure). In addition, the data from our study did not indicate trends favoring ACD **CPR** in any clinically significant subgroup or better outcomes for ACD **CPR** after multivariate adjustment.

An important consideration not seen in drug trials is whether the intervention...

...case a device, was properly implemented throughout the study. For a technique such as ACD **CPR** to be effective in everyday clinical practice, it must be readily learned and properly performed...
...train more than 1000 rescuers, including hospital staff, ambulance workers, and firefighters, to perform ACD **CPR** in many different situations. We are confident that our rigorous training, testing, retraining, and monitoring...

...are aware that an important proportion of rescuers noted fatigue and discomfort when performing ACD **CPR** and that this technique requires more work than standard **CPR** .(51) Of greater concern is that the ACD device did not adhere to the chest...

...hoe subgroup analysis excluding patients with inadequate decompression also failed to demonstrate benefit from ACD **CPR** . Some in-hospital patients randomized to undergo ACD **CPR** did not actually undergo this technique because of very brief **resuscitations** . Again, however, on analysis according to the treatment actually performed, no improvement in survival was found with ACD **CPR** .

Our study did not address the use of ACD **CPR** in 2 important groups of patients with cardiac arrest, those under the age 16 years...

...of ambulance services in Ontario, our prehospital patients had relatively long intervals from collapse to **CPR** , from **CPR** to ACD **CPR** , and from **CPR** to ACLS. Our study did, however address the use of ACD **CPR** in many different clinical scenarios, including in-hospital patients, who tended to have more prearrest morbidity but were **resuscitated** very rapidly, as well as prehospital patients, who had fewer documented medical problems. This study was, to our knowledge, the largest clinical of **CPR** yet conducted. We believe, therefore, that the diversity of our patient population, our large sample...

...arrest, regardless of the setting. Our study did not demonstrate a beneficial effect of ACD **CPR** on the survival or neurologic outcome of patients with cardiac arrest. We were unable to identify any subgroup of patients or any circumstance in which ACD **CPR** was associated with a better outcome.

This study was supported by grant 07992N from the...

...and My-Linh Tran, the data management team; to Silvia Visentin for manuscript assistance; to **Keith** **Lurie** , MD, for review of the manuscript; and to the hundreds of **respiratory** therapists, orderlies, nurses, physicians, ambulance officers, firefighters, and police officers in Ottawa-Carleton and London...

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DESCRIPTORS: **CPR** (First aid...
19960508

6/3,K/9 (Item 6 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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08501248 SUPPLIER NUMBER: 17997375 (USE FORMAT 7 OR 9 FOR FULL TEXT)
FDA gets feedback on informed consent waiver.(Medical News & Perspectives)
Marwick, Charles
JAMA, The Journal of the American Medical Association, v275, n5, p347(1)
Feb 7, 1996
ISSN: 0098-7484 LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 878 LINE COUNT: 00075

... she said.
One of the leaders of those who initially drew attention to the issue, **Keith Lurie** , MD, associate professor of medicine, University of Minnesota, Minneapolis, said the proposal fell far short...

...comments were in favor of the proposal. Biros is chair of the Coalition of Acute **Resuscitation** and Critical Care Researchers, which supports a waiver for this type of research.
The FDA...

19960207

6/3,K/10 (Item 7 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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08230431 SUPPLIER NUMBER: 16646403 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Research in emergency circumstances.(Medical News & Perspectives)
Marwick, Charles
JAMA, The Journal of the American Medical Association, v00000273, n9, p687(2)
March 1, 1995
ISSN: 0098-7484 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 1796 LINE COUNT: 00147

... dismutase (PEG-SOD) in severe closed head injury; the use of active compression-decompression cardiopulmonary **resuscitation** (ACD- **CPR**) with a suction device in cardiac arrest; the use of hypothermia in acute head injury; and a study of immediate vs delayed fluid **resuscitation** in hypotensive patients with penetrating body injury.
"These studies are all based on sound science...

...Medical Center, Charlotte, NC. Short-term survival is improved in some patients treated with ACD- **CPR** ; survival is also improved in patients in hemorrhagic shock where additional fluids were not given...

...s a question of justice," he declared.
The issue was put even more bluntly by **Keith Lurie**, MD, of the University of Minnesota Medical School, Minneapolis. Lurie is the principal investigator of the study on the cardiopulmonary **resuscitation** device, another of the studies summarized at the meeting (JAMA. 1994;271:1405-1411). "The...

...We have been compromising the health of all Americans by not permitting research on cardiac **resuscitation** to proceed in a scientifically sound fashion. If you have a cardiac arrest after leaving...them of the most advanced care. We have come to a grinding halt on cardiac **resuscitation** research. The regulations must be changed. We need action and we need it quickly."
In...

19950301

6/3,K/11 (Item 8 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB

07612681 SUPPLIER NUMBER: 15998072 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Compression-decompression CPR : the Biomotor. (cardiopulmonary resuscitation) (includes reply) (Letter to the Editor)
Lerman, Sam I.; Olson, Carin M.; **Lurie, Keith G.**
JAMA, The Journal of the American Medical Association, v272, n19, p1477(2) Nov 16, 1994
DOCUMENT TYPE: Letter to the Editor ISSN: 0098-7484 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT
WORD COUNT: 1052 LINE COUNT: 00084

Compression-decompression CPR : the Biomotor. (cardiopulmonary resuscitation) (includes reply) (Letter to the Editor)
... **Lurie, Keith G.**

TEXT:
...premature termination by the Food and Drug Administration (FDA) of trials of compression-decompression cardiopulmonary **resuscitation** (**CPR**), because of lack of informed consent.
The addition of a suction phase to conventional **CPR** is a trivial, innocuous detail that should not require consent. The developers of the Ambu...
...might be minor ecchymoses.
In any case, the use of alternate pressure and suction for **CPR** is described in the August 5,1939, Wiener Medizinische Wochenschrift by Dr Rudolph Eisenmenger, Facharzt fur physikalische Therapie, Vienna, Austria.
His device, which he called a Biomotor, was a cuirass **ventilator** that applied alternate positive and **negative** air **pressure** to the torso, and was used extensively throughout Europe for mine rescue and other victims...

...He compared his device with "the American Iron Lung" stating that both were equally good **ventilators** but that only the Biomotor could circulate blood during cardiac arrest, and his illustration showed...

...the pressure phase. This is probably the earliest description of the "thoracic pump" theory of **CPR** and merits a trial for any low-cardiac-output syndrome where counterpulsation might help, since compression of the extremities during cardiac diastole is equivalent to

negative pressure over the torso.

I hope that the FDA will realize that the minimal vacuum of...

...can do no more harm than traditional vacuum cupping. The evaluation of active compression-decompression **CPR** in victims of out-of-hospital cardiac arrest must be continued.

Sam I. Lerman, MD

Southfield, Mich [1.] Olson CM. The letter or the spirit: consent for research in **CPR** . JAMA. 1994;271: 1445-1447. [2.] Lurie KG, Shultz JJ, Callaham ML, et al. Evaluation of active compressiondecompression **CPR** in victims of out-of-hospital cardiac arrest. JAMA. 1994;271: 1405-1411.

In Reply...

...the Biomotor, an early device that alternately applied pressure and suction to the torso to **ventilate** the lungs and circulate blood.

How the FDA handles the particular case of active compression-decompression **CPR** is really a secondary issue. More important is the general need for researchers, regulators, ethicists, and the concerned public to develop workable mechanisms by which **resuscitation** research can proceed while patients' rights and safety are protected.

Carin M. Olson, MD

Contributing...

...Dr Lerman is correct that studies evaluating the addition of a suction phase to conventional **CPR** should not require consent as the patients are pulseless, without a palpable blood pressure, and...
...that approach during our recent clinical trials to determine the efficacy of active compression-decompression **CPR** but were told (and continue to be told) by FDA officials that the handheld suction...

...the living and the nearly dead.

Lerman is also correct that active chest decompression during **CPR** improves vital organ blood flow.[1] However, he is incorrect about his description of the...

...a controlled fashion. Unlike many previous devices designed to improve the dismal results with standard **CPR** , the Ambu device is lightweight, and its use does not take any more time to initiate than standard **CPR** . The time element is critical. No device, including the Ambu device, will work unless **CPR** is initiated very soon after cardiac arrest and unless it is effectively incorporated into an...

...Lerman. Unfortunately, the regulators at the FDA do not appear to know the history of **CPR** or the reality of modern **CPR** . Until these kinds of devices and drugs are allowed to shed their "significant risk" status...

...Thus, in the United States, these patients remain victims of both cardiac and regulatory arrest.

Keith G. **Lurie** , MD

University of Minnesota

Minneapolis

[1.] Shultz JJ, Coffeen P, Sweeney M. Evaluation of standard and active compression-decompression **CPR** in an acute human model of ventricular fibrillation. Circulation. 1994;89:684-693. [2.] Hans H. Device for promoting **respiration** , US patent number 2 067 268. Filing date March 1934, in Wiesbaden, Germany. [3.] Luile KE. Active compression-decompression **CPR** : a progress report. **Resuscitation**0 . In press.

...DESCRIPTORS: **CPR** (First aid

19941116

6/3,K/12 (Item 9 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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07587178 SUPPLIER NUMBER: 15925023 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Active compression-decompression CPR . **(includes reply) (Letter to the Editor)**
Mazziotti, Alexander; **Lurie, Keith G.**
JAMA, The Journal of the American Medical Association, v272, n17, p1325(2) Nov 2, 1994
DOCUMENT TYPE: Letter to the Editor ISSN: 0098-7484 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT
WORD COUNT: 1006 LINE COUNT: 00083

Active compression-decompression CPR . **(includes reply) (Letter to the Editor)**
... **Lurie, Keith G.**

TEXT:
To the Editor.--Dr Lurie and colleagues[1] conclude that active compression-decompression (ACD) cardiopulmonary **resuscitation** (**CPR**) appears to be more effective than standard **CPR** in certain subsets under study. This statistical inference is dependent on matching baseline characteristics as...
... infarction in an otherwise healthy person is the most likely condition to have a successful **CPR** outcome. On the other hand, if the pathway to arrest is pulmonary embolus, massive cerebral...

...to obtain with data concerning patients who arrest in hospital.[2]
In comparing forms of **CPR** , we must not forget that a major determining factor in their success following an arrest...

...the patient since this governs the relative probability that death can be reversed by the **CPR** procedures.
Alexander Mazziotti, MD, Phd Hawthorne, NJ [1.] Lurie KG, Shultz JJ, Callaham ML, et al. Evaluation of active compressiondecompression **CPR** in victims of out-of-hospital cardiac arrest. JAMA. 1993;271: 1405-1411. [2.] Cohen TJ, Goldner BG, Maccaro PC, et al. A comparison of active compressiondecompression cardiopulmonary **resuscitation** with standard cardiopulmonary **resuscitation** for cardiac arrest occurring in the hospital. N Engl J Med. 1993;329: 1918-1921...

...challenges in designing and executing a study to determine the effectiveness of different methods of **CPR** . When comparing two treatment groups, it is essential that both methods of **CPR** are performed correctly, in similar patient populations, and that the study design enables adequate data...

...variables associated with the research, as described by the Utstein conference on uniform standards for **CPR** research.[1]
In our evaluation of the effectiveness of ACD **CPR** in patients with out-of-hospital cardiac arrest, our study was designed to maximize the...

...out the importance of similar clinical characteristics between groups. In our study, both the standard **CPR** group and the ACD **CPR** group had very similar baseline characteristics in terms of age, sex, prior cardiac history, presenting rhythm, 911 call-response interval, and use of

bystander **CPR** and epinephrine. Given the space limitations, we did not present a detailed report of the...

...excluded from this study. Approximately 60% of the 130 patients enrolled in the study had **CPR** initiated within less than 10 minutes after collapse (downtime <10 minutes). The detailed clinical characteristics...

...than 10 minutes and less than 4 minutes. We observed a significant increase in immediate **resuscitation** in both subgroups. These results are similar to recent studies comparing ACD **CPR** with standard **CPR** in patients with in-hospital cardiac arrests.[2,3] Regardless of whether these kinds of...

...were critical and relevant.

Although I agree with Mazziotti that one major determinant for successful **resuscitation** is the overall clinical status, probably the most important variables in a large clinical study...

...groups are those associated with the test site itself Choosing a test site in which **CPR** is delivered in an expeditious, efficient, and carefully controlled manner by qualified and well-trained...

...a well-managed emergency medical services system is crucial when evaluating any new method of **CPR** .

Keith G. **Lurie** , MD University of Minnesota Minneapolis [1.] Cummins RO, Chamberlain DA, Abraynson NS, et al. Recommended...

...2.] Cohen TJ, Goldner BG, Maccaro PC, et al. A comparison of active compressiondecompression cardiopulmonary **resuscitation** with standard cardiopulmonary **resuscitation** for cardiac arrests occurring in the hospital. N Engl J Med. 1993;329: 1918-1921...

...Tucker KJ, Galli F, Savitt MA, Kahui D, Bresnahan L, Redberg RF. Active compression-decompression **resuscitation** : effects on **resuscitation** success after inhospital arrest. J Am Coll Cardiol. 1994;24:201-209.

DESCRIPTORS: **CPR** (First aid...
19941102

6/3,K/13 (Item 10 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
(c)2004 The Gale Group. All rts. reserv.

07281080 SUPPLIER NUMBER: 15469653 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Evaluation of active compression-decompression CPR **in victims of out-of-hospital cardiac arrest. (cardiopulmonary** resuscitation **)**
Lurie, Keith G. ; Shultz, Jeffrey J.; Callaham, Michael L.; Schwab, Theresa M.; Gisch, Terry; Rector, Thomas; Frascone, Ralph J.; Long, Linda
JAMA, The Journal of the American Medical Association, v271, n18, p1405(7)
May 11, 1994
ISSN: 0098-7484 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 5512 LINE COUNT: 00428

Evaluation of active compression-decompression CPR **in victims of out-of-hospital cardiac arrest. (cardiopulmonary** resuscitation **)**
Lurie, Keith G ...

ABSTRACT: Active compression-decompression (ACD) cardiopulmonary **resuscitation** (**CPR**) appears to be more effective than standard **CPR** in

some cases of cardiac arrest that occurs outside of a hospital. ACD **CPR** involves the use of a hand held suction device which is applied to the surface...

...return of spontaneous circulation and neurological function of 77 cardiac arrest patients who received standard **CPR** and 53 cardiac arrest patients who received ACD **CPR** were compared. Those who received ACD **CPR** had a 59% chance of surviving until admittance to an intensive care unit when the...

...response time was less than 10 minutes. The corresponding figure for those who received standard **CPR** was 33%. Thirty-one percent of ACD **CPR** patients returned to normal neurological function. Twenty percent of those receiving standard **CPR** returned to normal neurological function. However, the number of patients studied was too small to...

...be drawn from this result. Thirty-eight percent of the 32 patients who received ACD **CPR** within 10 minutes of cardiac arrest survived until hospital discharge compared with 20% of the 49 patients who received standard **CPR** .
AUTHOR ABSTRACT: Objective.--Active compression-decompression (ACD) cardiopulmonary **resuscitation** (**CPR**) appears to improve **ventilation** and coronary perfusion when compared with standard **CPR** . The objective was to evaluate potential benefits of this new **CPR** technique in patients with out-of-hospital cardiac arrest in St Paul, Minn. Design.--Ten...

...000. Patients.--All nonnothermic victims of nontraumatic cardiac arrest older than 8 years who received **CPR** . Main Outcome Measures.--Return of spontaneous circulation, admission to the intensive care unit (ICU), return ...

...discharge with return of baseline neurological function, and complications. Results.--Seventy-seven patients received standard **CPR** and 53 patients received ACD **CPR** . The mean emergency medical services call response interval was less than 3.5 minutes. When all patients were considered, a higher percentage of ACD **CPR** patients had a return of spontaneous circulation and were admitted to the ICU vs standard **CPR** (45%vs31%, and 40%vs 26%, respectively), but these trends were not statistically significant (P...

...significant differences were found between hospital discharge rates (1 2 [23%] of 53 for ACD **CPR** vs 13 [17%] of 77 for standard **CPR**), return to baseline neurological function (10 [19%] of 53 for ACD **CPR** vs 13 [17%] of 77 for standard **CPR**), or return to baseline neurological function at hospital discharge (nine [17%] of 53 for ACD **CPR** vs 12 [16%] of 77 for standard **CPR**). Return of spontaneous circulation, ICU admission, and neurological recovery in both **CPR** groups were highly correlated with downtime (time from collapse to emergency medical system personnel arrival ...

...less than 10 minutes' downtime, survival to the ICU was 59% (19/32) with ACD **CPR** and 33% (16/49) with standard **CPR** (P<.02), return to baseline neurological function was 31% (10/32) with ACD **CPR** and 20% (10/49) with standard **CPR** (P=.27), and hospital discharge rate was 38% (12/32) with ACD **CPR** and 20% (10/49) with standard **CPR** (P=.17). Complication rates in patients admitted to the hospital were similar in both groups. Conclusions.--This study demonstrates that ACD **CPR** appears to be more effective than standard **CPR** in a well-defined subset of victims of out-of-hospital cardiac arrest during the critical early phases of **resuscitation** . Based on this study, a larger study should be performed to

evaluate the potential long-term benefits of ACD **CPR** . (JAMA. 1994;271:1405-1411)

TEXT:

DESPITE the widespread application of standard cardiopulmonary **resuscitation** (**CPR**), the overwhelming majority of victims of out-of-hospital cardiac arrest the within hours. The...

...dismal.[1,2] After describing the report of a patient in cardiac arrest who was **resuscitated** by family members using a standard household plunger, we recently developed a new method of **CPR** termed active compression-decompression (ACD) **CPR** .[3,4] Subsequent studies in animals and humans using a handheld suction device applied to the chest during **CPR** indicated that ACD **CPR** , when compared with standard **CPR** , improves multiple hemodynamic and **respiratory** parameters during ventricular fibrillation, asystole, and electromechanical dissociation. Building on these observations, we conducted this study to provide estimates of the potential risks and benefits of ACD **CPR** vs standard **CPR** in victims of out-of-hospital cardiac arrest.

METHODS

CPR Device and Training

All ACD **CPR** was performed with a lightweight 1.4-lb (0.6-kg) device (Ambu CardioPump, Ambu...

...Figure). The gauge is designed to ensure depth of compression equivalent to that with standard **CPR** (3.8 to 5.1 cm [1.5 to 2 in]). It is marked with...

...the study, including children older than 8 years, received chest compressions with both methods of **CPR** .

The study was conducted in conjunction with the St Paul (Minn) Fire Department. The fire...

...fire department emergency medical services (EMS) personnel were required to have special training on ACD **CPR** by St Paul-Ramsey EMS prior to beginning the study. During these sessions, standard CPR techniques were reviewed and ACD **CPR** was demonstrated. The first session included an instructional video, a didactic talk about the study...

...lifting up" during active decompression, which has a fundamentally different feel when compared with standard **CPR** , and the importance of patient randomization. During these training sessions, all EMS personnel were required to demonstrate ACD **CPR** competency on a mannequin in a simulated cardiac arrest prior to using the ACD device on patients. A second training session reemphasizing standard and ACD **CPR** technique was given prior to the scheduled crossover of EMS teams from one type of **CPR** to the other.

Study Site and Subjects

The study was approved by the Institutional Review...

...use the ACD device and those on the west side were assigned to use standard **CPR** . After approximately every 40 patients or 75 days, there was a crossover between the east and west sides of St Paul, and the alternate method of **CPR** was used. During the course of the study, standard **CPR** was used for a total of 5 months by EMS personnel from the east and west sides of the city, and ACD **CPR** was also used by the same EMS personnel, at different times, for a total of 5 months. Performance of either standard **CPR** or ACD **CPR** was determined by whether the first rescue vehicle to the scene was based on the east side or west side. Once it had been determined which method of **CPR** should be performed, the appropriate method was initiated and used throughout the arrest.

The decision to initiate **CPR** on a victim was a clinical decision made according to previously established St Paul-Ramsey...

...downtime, body tone and temperature, presence of a known terminal illness or a do-not- **resuscitate** order, and the initial rhythm on the defibrillator monitor. When ACD **CPR** was used, it was continued as needed during patient transport and in the emergency department. The decision to stop **CPR** or to admit the patient to the intensive care unit (ICU) was made by emergency department physicians based on whether or not victims could be **resuscitated** and sufficiently stabilized to be transported to the ICU. In an effort to eliminate outcome...

...the results until after the study. Furthermore, the investigators did not discuss which method of **CPR** was used with medical personnel caring for the patients once they were admitted to the...arrest, treatment in the field, nature of arrest, whether it was witnessed, use of bystander **CPR** , ROSC, baseline neurological function (as determined by being alert and oriented to person, place, and time), complications from **CPR** , and ACD **CPR** device function. The presenting rhythm, evaluated after a "quick look" with defibrillator patches, was obtained before initiating **CPR** in about half of the cases and after several minutes of **CPR** in the rest. Both BLS and ALS EMS personnel were dispatched immediately after a 911 call. Whichever service arrived first initiated the appropriate method of **CPR** . All ALS response units (n=9) have defibrillation capabilities. Only two of 18 BLS units...

...prospective study, we also performed a retrospective analysis to determine the success rate of standard **CPR** during the same 10-month period in the year prior to this current study. Records...
...the 911 responses by the fire rescue personnel were reviewed. In those cases where standard **CPR** was performed, data collected were related to ROSC, survival to the ICU, and whether they...

...patient inclusion criteria as in the prospective study.

Because of the emergent setting during which **CPR** was performed, consent requests were not made to families of patients receiving ACD **CPR** . However, no family member or bystander objected to the use of the ACD **CPR** device in any patient during the study. During the first 5 months of the study...

...were not blinded to results in order to monitor any potential negative effects of ACD **CPR** on a day-to-day basis. Following completion of the first full crossover and review of the preliminary data (which demonstrated no significant adverse effects from ACD **CPR**), all investigators were blinded to the results until the completion of the study, with the...

...that the US Food and Drug Administration (FDA) wanted all clinical trials using the ACD **CPR** device terminated. Given the lack of adverse outcomes at that time, we were granted permission...

...subjects who had the greatest likelihood of recovery and to compare the two methods of **CPR** . Fisher's Exact Test was used for all analyses when expected values were less than...

...Simon.[10] The 95% CI was calculated as the difference in outcome proportions between ACD **CPR** and standard **CPR** . Prior to beginning the study, we decided that patients who received both methods of **CPR** by fire rescue personnel, despite random assignment to one specific method, would not be included...

...data analysis. In addition, we predetermined that patients who were treated with one method of **CPR** , despite random assignment to the other method of **CPR** , would be analyzed by the method of treatment received.

The planned enrollment in this study...

...RESULTS

Of the 130 out-of-hospital arrests during the study period, 77 received standard **CPR** and 53 received ACD **CPR** . Standard **CPR** was used 36 times (47%) by first EMS rescuers on the east side of St Paul and 41 times (53%) on the west side: ACD **CPR** was used 29 times (55%) on the east side and 24 times (45%) on the west side of St Paul. Three patients received both methods of **CPR** and none survived to be admitted to the ICU. Eight patients received standard **CPR** despite random assignment to ACD **CPR** . Four of these eight had witnessed arrests with downtimes of zero minutes, and two others...

...5 and 6 minutes. The remaining two victims who did not receive the method of **CPR** to which they were assigned had unwitnessed arrests and estimated downtimes of 10 to 20...

...the ICU (one after an ROSC), and one received less than 15 seconds of standard **CPR** , was defibrillated, and had a full recovery.

The treatment groups were similar with respect to...

...two groups were also similar with regard to number of witnessed arrests, performance of bystander **CPR** , response intervals, presenting rhythm documented by the first responders, the dosage and ...first defibrillation in patients presenting with ventricular fibrillation, the number of defibrillation attempts, and total **CPR** duration (Table 1). The downtime between **CPR** groups was relatively short, but averaged nearly 2 minutes longer in the ACD **CPR** group compared with the standard **CPR** group P<.05) (Table 1). The proportion of victims with downtimes less than 10 minutes was similar between **CPR** groups (61% for ACD **CPR** vs 63% for standard **CPR**). At least 1 mg of epinephrine was administered to 77% of the ACD group and...

...than 1 mg was also similar in both groups. In addition, the total duration of **CPR** was similar between both groups.

[TABULAR DATA 1 OMITTED]

Comparison of **CPR** efficacy between the two methods of **CPR** was made using several different endpoints. Results related to ROSC, ICU admission rates, return to...

...hospital while alert and oriented are shown in Table 2. When all patients who received **CPR** by the fire rescue personnel were compared, regardless of whether arrests were witnessed, there was a trend toward improvement in the rates of ROSC and ICU admission with ACD **CPR** compared with standard **CPR** . Overall, 40% of the patients in the ACD **CPR** group were admitted to the ICU vs 26% in the standard **CPR** group (P<.10). Details related to the outcome of each patient who was admitted to...

...ICU admission, return to baseline neurological function, and hospital discharge, regardless of the method of **CPR** , we examined the relationship of these endpoints and different clinical variables using data from both...

...ROSC and were admitted to the ICU with downtimes less than 4 minutes after ACD **CPR** (73%) compared with standard **CPR** (33%) (P<.05). In patients with downtimes between 4 and 9 minutes, ACD **CPR** appeared to be more effective, but the differences between the two methods of **CPR** were less pronounced. Six patients with unknown downtimes were admitted to the ICU, and three of these six patients, all in the standard **CPR** group, had

a full recovery.

[TABULAR DATA 5 OMITTED]

Similar potential benefits of ACD **CPR** were observed when analysis was limited to victims of witnessed arrests (Table 5). In witnessed arrests, 50% of the patients in the ACD **CPR** group were admitted to the ICU vs 31% in the standard **CPR** group (P<.10). A significant improvement in the rates of ROSC and ICU admission differences...

...witnessed arrests with less than 10 minutes of downtime, 59% of patients in the ACD **CPR** group vs 33% of patients in the standard **CPR** group were admitted to the ICU (P<.02; 95% CI, 4% to 48%). Based on...

...patients in the ACD group and 20% of the the 49 patients in the standard **CPR** group were discharged from the hospital (P=. 17; 95% CI, -2% to 38%). The number...

...of patients who remained comatose after ICU admission was similar regardless of the method of **CPR** (eight of 21 patients after ACD **CPR** vs six of 20 patients after standard **CPR** ; P=.6).

Potential complications as a result of use of either **CPR** method were monitored throughout the study. Chest roentgenograms were obtained in all patients admitted to the ICU. In the standard **CPR** group, there were seven patients with rib and/or sternal fractures, one patient with a...

...arrival of the first response team, 17 (22%) of the 77 patients in the standard **CPR** group and in 13 (25%) of the 53 patients in the ACD **CPR** group had evidence of vomiting. During or after **CPR** , an additional five patients in the standard group and four patients in the ACD group...

...the device and the sternum secondary to a friction burn. One patient in the standard **CPR** group also had a superficial denuding of skin over the sternum, but the difference between statistically significant P<.01).

In the 53 patients in whom the ACD **CPR** device was used, paramedic unit captains reported that suction was good to excellent 46 times...

...patients older than 8 years in nontraumatic, normothermic out-of-hospital cardiopulmonary arrest who received **CPR** during the same 10-month period in the year prior to our study. During that time, 53 (36%) of patients who received **CPR** had an ROSC, 32 (22%) were admitted to the ICU, 14 (9%) were alert and...

...retrospectively obtain reliable information related to whether the arrests were witnessed, the use of bystander **CPR** , the call response interval, the initial rhythm, or the duration of downtime.

COMMENT

Outcomes Analyses

The purpose of this study was to prospectively examine the efficacy of ACD **CPR** in patients with out-of-hospital cardiac arrest. The results demonstrate that in two groups...

...characteristics, there was a trend toward increased rates of ROSC and ICU admission after ACD **CPR** when compared with standard **CPR** . In patients with less than 10 minutes between collapse and arrival of the first response...

...to the scene, there was a significant increase in the ICU admission rates with ACD **CPR** (59%) compared with standard **CPR** (33%) (P<.02). Improvement in short-term survival in victims of out-of-hospital cardiac arrest of this magnitude has not been reported since the first description of manual **CPR** more than three decades ago.[11-14]

The duration between the time of collapse and the initiation of **CPR**

was found to be highly associated with a positive outcome, similar to observations by others who have found standard **CPR** to be most effective when initiated less than 4 minutes after cardiac arrest.[11] Therefore, we performed subset analysis on patients with relatively short downtimes and found ACD **CPR** was significantly more effective than standard **CPR** with less than 4 minutes of **CPR** : more than 80% of the patients had an ROSC after ACD **CPR** compared with 33% after standard **CPR** ($P<.01$), and 73% of the patients were admitted to the ICU after ACD **CPR** compared with 33% after standard **CPR** ($P<.05$). Although analysis of patients with downtimes from 4 to 9 minutes suggests that the use of ACD **CPR** may extend the window of opportunity between the time of arrest and the initiation of **CPR** that can ultimately lead to a successful outcome, more patients will be needed to demonstrate...

...minutes, return to baseline neurological function was observed in 31% of the patients after ACD **CPR** and 20% of the patients after standard **CPR** ($P=.27$). Included in the standard **CPR** group were two patients who received chest compressions for less than 30 seconds prior to...

...comatose or neurologically impaired after admission to the ICU was similar with both methods of **CPR** .

No significant differences in the complication rates were observed in patients admitted to the hospital with the use of ACD **CPR** compared with standard **CPR** , with one exception. There was a significant increase in localized hematomas in patients receiving ACD **CPR** . The contact point between the device and the chest wall has subsequently been redesigned to ...

...demonstrate that suction was adequate to good in more than 90% of patients when ACD **CPR** was performed. Despite the presence of significant chest hair or large breasts, adequate suction could...

...in the vast majority of patients.

This study adds to the growing evidence that ACD **CPR** may improve outcomes for some patients in cardiac arrest.[4,5,8,15-17] Two recent in-hospital studies demonstrated a similar improvement in the ICU admission rate between ACD **CPR** and standard **CPR** .[15,16] There were too few patients to know with certainty about long-term outcomes...

...the studies were terminated. In May 1993, the FDA stopped all clinical trials of ACD **CPR** in the United States until safety and efficacy are assessed in a large multicenter in...

...being enrolled in the study. Thus, it will not be possible to further evaluate ACD **CPR** efficacy in patients in out-of-hospital cardiac arrest for several years in the United States. Larger in-hospital and prehospital studies will be needed to know definitively whether ACD **CPR** will improve long-term clinical outcomes.

Study Variables

The evaluation of any type of **CPR** efficacy is dependent on the effectiveness and structure of the entire EMS system. St Paul...personnel included paramedics who were capable of delivering early defibrillation. All EMS personnel have annual **CPR** training and received training immediately prior to beginning this study and prior to the first...

...the St Paul adult population has received formal training, at least one time, in standard **CPR** . Thus, all of these factors, when considered as a whole, may contribute to the potential benefits of ACD **CPR** observed in St Paul.

To determine whether participation in our study altered ICU admission

rates in the standard **CPR** group compared with historical controls, we examined the records of all victims of nontraumatic, normothermic cardiac arrest who received standard **CPR** during the same 10-month period from the previous year. The total number of patients...

...compared with 17% during our study (P<.1). Although the ICU admission rates with standard **CPR** were similar, the improvement in neurological function in patients with standard **CPR** in our study group suggests that there may have been a "training effect" or Hawthorne effect from being in a study. The importance of training with both methods of **CPR** cannot be overemphasized. In our study, we underscored the notable differences in feel and practice between standard **CPR** and ACD **CPR** during the training to help ensure correct practice of the two techniques.

We intentionally designed...

...had arrived at the scene and, despite extensive training and patient assignment to receive ACD **CPR** , neglected to use the ACD device at the moment of the arrest. Careful review of...

...first responders. Clinical outcomes of these eight patients were similar to others who received standard **CPR** . Nonetheless, the likelihood for treatment assignment errors, with the unassigned use of standard **CPR** since it does not involve taking out an additional piece of equipment, remains a potential problem for any study comparing manual **CPR** with an alternative method.

Conclusions

This study demonstrates that ACD **CPR** appears to be more effective than standard **CPR** in a well-defined subset of victims of out-of-hospital cardiac arrest during the critical initial phases of **resuscitation** . Based on this study, a larger study should be performed to evaluate the potential long-term benefits of ACD **CPR** .

We thank the members of the St Paul Fire Department and St Paul-Ramsey Emergency...

...manuscript.

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Active compression-decompression: a new method of cardiopulmonary resuscitation .
Cohen, Todd J.; Tucker, Kelly J.; **Lurie, Keith G.** ; Redberg, Rita F.; Dutton, John P.; Dwyer, Kathy A.; Schwab, Theresa M.; Chin, Michael C.; Gelb, Alan M.; Scheinman, Melvin M.; Schiller, Nelson B.; Callaham, Michael L
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Active compression-decompression: a new method of cardiopulmonary resuscitation .
... **Lurie, Keith G**

ABSTRACT: A mechanical device that allows doctors to decompress the chest actively during cardiopulmonary **resuscitation** (**CPR**) rather than passively may be more effective in restoring heart function in patients who are...
...received conventional care for at least 10 minutes. Each patient was randomized to receive either **CPR** with an active compression-decompression (ACD) device or traditional **CPR** for two minutes; then they were switched to the alternate method. Blood pressure in eight patients increased significantly when they were switched from **CPR** to ACD- **CPR** . Doppler echocardiography during ACD- **CPR** showed that blood flow from the heart increased, compared to **CPR** . The echocardiogram also showed that the mitral valve, which controls the flow of blood into the left ventricle, opened much more widely during the relaxation phase of ACD- **CPR** , compared to **CPR** . ACD- **CPR** restored a stable rhythm in three of the patients, but none survived.
AUTHOR ABSTRACT: Objective.--To described and compare with standard

cardiopulmonary **resuscitation** (**CPR**) in humans a new form of **CPR** that involves both active compression and active decompression of the chest. Design.--Patients in cardiac...

...failed were randomized to receive 2 minutes of either standard or active compression-decompression (ACD) **CPR** using a custom, hand-held suction device, followed by 2 minutes of the alternate technique. The ACD device was applied midsternum and used to perform **CPR** according to the guidelines of the American Heart Association: 80 compressions per minute, compression depth of 3.8 to 5 cm, 50% duty cycle, and constant-volume **ventilation** . Mechanical Thumper **CPR** was also compared in five patients. End-tidal carbon dioxide ([ETCO.sub.2]) concentrations and...

...or -] SD [ETCO.sub.2] was 4.3 [+ or -] 3.8 mm Hg with standard **CPR** and 9.0 [+ or -] 3.9 mm Hg with ACD **CPR** (P<.0001). Systolic arterial pressure with standard **CPR** was 52.5 [+ or -] 14.0 mm Hg and with ACD **CPR** , 88.9 [+ or -] mm Hg (P<.003). The velocity time integral increased from 7.3 [+ or -] 2.6 cm with standard **CPR** to 17.5 [+ or -] 5.6 cm with ACD **CPR** (P<.0001), and diastolic filling times increased from 0.23 [+ or -] .09 seconds with standard PCP to 0.37 [+ or -]. 12 seconds with ACD **CPR** (P<.004). Mechanical Thumper **CPR** consistently underperformed both standard and ACD **CPR** . Minute **ventilation** obtained in four patients during ACD **CPR** without endotracheal **ventilation** was 6.6 [+ or -] 0.9 L/min. After 1 hour of standard **CPR** failed, three of 10 patients randomized to ACD CPR rapidly converted to a hemodynamically stable rhythm following 2 minutes for ACD **CPR** . Conclusion.--ACD **CPR** is a simple manual technique that improved cardiopulmonary circulation in 10 patients during cardiac arrest. Although ACD **CPR** may have produced a return of spontaneous circulation in three patients refractory to standard measures...

TEXT:

Despite the nearly universal application of standard cardiopulmonary **resuscitation** (**CPR**), most out-of-hospital cardiac arrest patients do not survive.[1-5] In an effort...

The standard method of manual **CPR** , first described by Kouwenhoven et al[25] more than three decades ago, relies on the...

...and passive decompression of the chest wall. The importance of an active decompression phase of **CPR** was recently suggested by an anecdotal report of successful cardiac **resuscitation** using a "plumber's helper" (household drain plunger) applied to the anterior chest wall.[26...

...that a simple suction device could assist chest wall expansion and improve the hemodynamics during **CPR** , active compression-decompression (ACD) **resuscitation** was compared with standard **CPR** in a canine model of cardiac arrest.[27] In eight dogs, cardiac output, systolic aortic pressure, coronary artery perfusion pressure, and minute **ventilation** were significantly augmented with ACD **resuscitation** compared with standard **CPR** .

Based on these results, we proceeded to test the same technique in humans. The purpose of this study was to prospectively compare ACD **resuscitation** with standard methods of **CPR** in a randomized fashion in 10 humans during cardiac arrest.

METHODS

ACD **Resuscitation**

The ACD device consists of a rubber suction header, bellows, and handle, with a radius...

...both force and depth of compression to ensure chest compressions similar

to those with standard **CPR** . Preliminary mannequin testing was performed to ensure compression equivalent to that with standard **CPR** . The monitoring gauge was marked with three compression target levels: 29.25 kg for a...

...kg for an average man, and 49.5 kg for a large man. For ACD **CPR** , the device was aligned midsternum at the level of the nipples; compression was performed in...

...Fire Department fire fighters and paramedics on all patients. On arrival in the emergency department, **resuscitation** was directed by either the attending physician or senior resident physician according to ACLS guidelines.[29] Patients were intubated orotrachaelly (if not already intubated), and bag **ventilation** with a 100% fraction of inspired oxygen was used.

While standard ACLS was being performed, a special ACD code team prepared for a randomized trial of ACD vs standard **CPR** . Once patients were monitored with intra-arterial pressure transducers, transesophageal echocardiography, and capnometry, if they...
...randomized (via a random numbers table) to receive 2 minutes of either standard or ACD **CPR** followed sequentially by 2 minutes of the alternate technique. Constant-volume hand-assisted bag **ventilation** with 100% oxygen was provided by a registered **respiratory** therapist. Both methods of **CPR** were performed at 80 compressions per minute (metronome synchronized) with a 50% duty cycle in accordance with AHA guidelines.[28] After the 4-minute experimental **CPR** protocol, hand-assisted bag **ventilation** was stopped in four patients and ACD **resuscitation** was performed for 1 additional minute while minute **ventilation** was measured using a volume spirometer. After 1 minute, hand-assisted **ventilation** was resumed. To discourage operator bias, when possible, standard **CPR** was performed by an ACLS-certified physician independent of the ACD code team. In addition...

...trial.

Samples for arterial blood gas measurements were collected before beginning the randomized trial of **CPR** and after completion of each 2-minute **CPR** segment; arterial placement was confirmed by return of well-oxygenated blood from the pressure catheter...

...concentrations were recorded at baseline and at 30-second intervals during 2 minutes of each **CPR** technique. Transmitral Doppler flow was recorded using a Sono 500 ultrasound system with a 21362A...
...the protocol. In addition, two-dimensional transesophageal echocardiographic imaging was performed before and after each **CPR** method. Random number sequences were used to code Doppler echocardiographic tapes to enable data analysis...

...ACD code team leader coordinated the protocol and monitored the depth and force of ACD **CPR** performed by another team member. A cardiologist placed the transesophageal probe and recorded two-dimension...

...data. A third member secured a femoral arterial line for pressure monitoring and performed ACD **CPR** . These measures typically took 15 minutes. A fourth member was responsible for calibrating ...Throughout the protocol the emergency department attending or resident physician maintained complete control of the **resuscitative** efforts. Decisions to terminate **resuscitation** and postresuscitation supportive measures were made by the emergency attending or resident physician. Patients did...

...before and after data collection. No patients received sodium bicarbonate at any time during their **resuscitation** .

Data Collection and Analysis

Forward transmitral flow (from the mitral valve leaflet tips) was continuously...

...analyzed off-line by an echocardiography not present at the arrest and blind to the **CPR** techique. Echocardiographic measurements included the trasmitral valve velocity time integral, left ventricular and left atrial ...

...concentrations were recorded every 30 second during 2 minutes of standard, ACD, and mechanical Thumper **CPR** . Hemodynamic and capnometry data were determined for each technique after 30, 60, 90, and 120...

...examined to determine details of treatment in the field, time between arrest and commencement of **resuscitation** , and transport time from the site of the arrest to the emergency department.

RESULTS

Patient...

...emergency department (patient 1) and one in the coronary care unit (patient 9). The experimental **CPR** protocol was started approximately 30 minutes after patients arrived in the emergency department. In seven of 10 cases, standard **CPR** was performed by an ACLS-certified physician who was not part of the special ACD...

...five patients, right ventricular displacement was quantitatively determined during compression during both ACD and standard **CPR** (via transesophageal echocardiographic imaging). Displacement of the right ventricle during the compression phase of ACD **CPR** was 4.3 [+ or -] 1.3 cm vs. 3.6 [+ or -] 1.5 cm with standard **CPR** (not significant). No randomized standard **CPR** data were obtained in patient 10 because of successful **resuscitation** after randomization to ACD **CPR** .

Table 1 shows the characteristics of each patient. The causes of arrest, as indicated by...

...asystole (one patient), or electrochemical dissociation (three patients). The time between arrest an when prehospital **CPR** was started varied considerably (0 to 20 minutes). The mean interval from the time of ...

...carbon dioxide concentrations were measured in eight of 10 patients during both ACD had standard **CPR** . The mean [ETco.sub.2] concentration increased from 4.3 [+ or -] 3.8 mm Hg with standard **CPR** to 9.0 [+ or -] 3.9 mm Hg with ACD **CPR** (P<.0001) (Fig 2).

Femoral arterial pressures were recorded in eight of 10 patients. The systolic arterial pressure increased from 52.5 [+ or -] 14.0 mm Hg with standard **CPR** to 88.9 [+ or -] 24.7 mm Hg with ACD **CPR** (P<.003) (Fig 3). There was no appreciable difference in diastolic arterial pressure between **CPR** techniques (Fig 3). Arterial pressure waveforms during standard **CPR** were of lower amplitude and more blunt than those during ACD **CPR** . A dicrotic notch was evident during ACD **CPR** but not during standard **CPR** (Fig 4).

No significant differences in arterial blood gas measurements were observed between the various **CPR** methods (Table 2). The mean initial arterial pH was 6.9 [+ or -] 0.18. Initial...

...was no significant difference between arterial blood gas measurements obtained after 2 minutes of standard **CPR** and those obtained after 2 minutes of ACD **CPR** .

Spirometry in four patients during ACD **CPR** without endotracheal **ventilation** revealed a minute **ventilation** of 6.6 [+ or -] 0.4 L/min

(range, 6.0 to 7.8 L/min). This is equivalent to a **ventilatory** volume of approximately 80 mL per compression. Negative inspiratory force was measured in one patient...by transesophageal Doppler echocardiography revealed a significant improvement in forward cardiac blood flow with ACD **CPR** compared with either standard or mechanical Thumper **CPR** . The transmitral valve velocity time integral increased from 7.3 [+ or -] 2.6 cm with standard **CPR** to 17.5 [+ or -] 5.6 cm with ACD **CPR** (P<.0001) (Fig 5). The mean diastolic filling time, determined by measuring either the left...

...was increased during the decompression phase from 0.23 [+ or -] 0.09 second with standard **CPR** to 0.37 [+ or -] 0.12 seconds with ACD **CPR** (P<.004) (Fig 6). In addition, there was a qualitative increase in left atrial size during the decompression (diastole) with ACD **CPR** compared with passive chest relaxation with standard **CPR** . Spontaneous contrast on two-dimensional transesophageal echocardiographic is an indicator of stasis of blood flow.[32] This spontaneous contrast was common during standard **CPR** but tended to clear (indicating improved blood flow) in all patients with ACD **CPR** .

Transesophageal two-dimensional echocardiographic imaging during standard **CPR** revealed that the right ventricle was compressed and the atrioventricular valves were closed. Figure 7...

...valve, appearing to facilitate ventricular filling.

Comparison With Mechanical Thumper

In addition to comparing standard **CPR** with ACD **CPR** , physiologic measurements were made in five patients who underwent mechanical Thumper **CPR** immediately prior to the randomized **CPR** trial. The compression depth was set (by the attending emergency physician) according to the manufacturer...

...generated lower systolic arterial pressures and [ETCO.sub.2] concentrations than both standard and ACD **CPR** . Figure 4 displays the arterial pressure recordings from a representative patient (patient 5), demonstrating a...

...improvement in systolic arterial pressures as one progresses from mechanical Thumper to standard to ACD **CPR** .

Electromechanical Effects of ACD **CPR**

In three of 10 patients (patients 1, 5, and 10) who underwent prolonged **resuscitation** with standard **CPR** (>1 hour), ACD **CPR** applied for only 2 minuted restored a hemodynamically stable rhythm. No patient in whom ACD **CPR** failed was **resuscitated** by standard **CPR** . Sinus rhythm was restored within less than 2 minutes after the application of ACD **CPR** in two patients (patients 1 and 10), and patient 5 converted from ventricular fibrillation to...

...later time due to either incessant tachyarrhythmias associated with hemodynamic instability or concern that prolonged **resuscitation** had resulted in severe brain damage.

COMMENT

This study demonstrates that ACD **CPR** , a simple manual technique, significantly improves cardiopulmonary circulation in humans during cardiac arrest compared with standard **CPR** . In contrast to previous techniques that require complicated machinery, an additional operator, or an awake patient, ACD **CPR** is a relatively simple variation on standard **CPR** .[7,9,15] The rate and depth and compression are those recommended by the AHA for standard manual **CPR** .[28] The device can be used with minimal training, requires no setup time, is used...

...been shown to be a reliable predictor of coronary perfusion pressure and

of likelihood of **resuscitation** from cardiac arrest.[35,42] The [ETCO.sub.2] concentration was increased from baseline in all of the four patients for whom it was recorded during ACD **CPR** . Such increases were not observed with either standard or mechanical Thumper **CPR** . There were no significant changes in arterial blood gas measurements with any technique in this...

...End-tidal carbon dioxide concentration during cardiac arrest has been shown to predict successful initial **resuscitation** with a sensitivity of 45% and a specificity of 94% in a similar patient population at our institution.[43] The average [ETCO.sub.2] concentration obtained with ACD **CPR** in these patients (9 mm Hg) has been previously associated with a 28% chance of initial **resuscitation** in our patient population, but the level obtained with standard **CPR** has been associated with a chance of initial **resuscitation** lower than 1%.[35,43] In fact, ACD **CPR** initially **resuscitated** 30% of patients in this study.

A significant increase in systolic arterial pressure was observed with ACD **CPR** compared with standard and mechanical Thumper **CPR** . Such increases in systolic arterial pressure have been associated with improved cerebral perfusion in humans...

...sub.2] concentration, functional improvements were quantitatively observed via transesophageal Doppler echocardiography imaging during ACD **CPR** . The velocity time integral (an analogue of cardiac output) and prolonged diastolic filling were augmented with ACD **CPR** compared with standard and mechanical Thumper **CPR** . These techniques of measurement have been validated and are highly accurate at cardiac outputs as...

...31] Spontaneous contrast on echocardiography is an indicator of vascular stasis and was common during **CPR** .[32] However, ACD **CPR** usually produced a clearing of spontaneous contrast, indicating improved blood flow. We speculate that ACD **CPR** produces a **negative** intrathoracic **pressure** during decompression and thereby improves venous return, transmitral ventricular filling, and cardiac output.

ACD **CPR** without hand-assisted orotracheal **ventilation** resulted in **ventilation** greater than 6 L/min. The significance of this observation remains unknown, but perhaps ACD **CPR** assists **ventilation** during cardiac arrest. No significant change in [PCO.sub.2] was observed after a short intervention of ACD compared with standard **CPR** .

There were a number of limitations to this study. First, patients had already undergone prolonged **resuscitation** before entry into the trial and thus had an extremely small chance of successful outcome...

...impact of the ACD device on survival is predicated on its application as soon as **CPR** is begun. Although ACD **CPR** restored a hemodynamically stable rhythm in three of 10 patients who underwent prolonged **resuscitation** , conclusions abou the impact of ACD **CPR** on survival cannot be made from these data. Second, the compression force of both standard and ACD **CPR** might have been variable across different operators and techniques. We attempted to control for this by closely and constantly monitoring compression rate and depth, having noninvestigators perform standard **CPR** , using a calibrated compression gauge with ACD **CPR** (to ensure comparable compression to standard **CPR**), and comparing the technique with mechanical Thumper **CPR** in half the patients. The blood pressures produced in our patients by standard **CPR** were similar to those reported by other investigators.[33,34,44,45] Additionally, systolic blood pressures comparable to those produced by ACD **CPR** cannot be achieved by increasing compression force if the rate is held constant.[46] Since...
...no significant difference in right ventricullar displacement during the compression phase of standard or ACD **CPR** , we believe that the

improvements in cardiopulmonary circulation probably resulted from active chest decompression. Our...

...was designed to measure the short-term physiologic and hemodynamic effects of ACD vs standard **CPR** in a randomized fashion. We did not assess the effects of ACD **CPR** on either regional perfusion or long-term survival. We did, however, measure the efficacy of...

...concentration, which has previously been shown to correlate well with coronary perfusion pressure and initial **resuscitation** .[35-42] Fourth, epinephrine was given to patients prior to the data-collection period, and ...

...variables. However, our study was a crossover design in which half the patients received ACD **CPR** first and half received standard **CPR** first; this design should cancel out any such effects.

In conclusion, ACD **resuscitation** offers a variation on standard manual **CPR** that converts the decompression phase from a passive to an active process. With ACD **resuscitation** , cardiovascular pulmonary and systemic hemodynamics were significantly improved in this small study of patients late in cardiac arrest. Further studies are necessary to determine the effects of ACD **CPR** on regional perfusion and long-term survival.

This study was supported in part by an...

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We gratefully acknowledge the assistance of the following individuals and members of the Cardiopulmonary **Resuscitation** Working Group: Sheryl Anderson, RN, Tina Bailey, RN, Christopher Barton, MD, Robert Buscho, MD, Kanu...

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...Melvin M. Scheinman, MD; Nelson B. Schiller, MD; Michael L. Callaham, MD; for the Cardiopulmonary **Resuscitation** Working Group From the Department of Medicine and the Cardiovascular Research Institute (Drs Cohen, Tucker...

...Cornell University Medical College, Manhasset, NY. A partial listing of the members of the Cardiopulmonary **Resuscitation** Working Group appears in the acknowledgments at the end of the article. Presented at the...

DESCRIPTORS: **CPR** (First aid...
19920603

6/3,K/15 (Item 12 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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04905571 SUPPLIER NUMBER: 10405375 (USE FORMAT 7 OR 9 FOR FULL TEXT)
CPR : **the P stands for plumber's helper. (cardiopulmonary** resuscitation **)**
(letter to the editor)
Lurie, Keith G. ; Lindo, Clinton; Chin, Jerome
JAMA, The Journal of the American Medical Association, v264, n13, p1661(1)
Oct 3, 1990
DOCUMENT TYPE: letter to the editor ISSN: 0098-7484 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT
WORD COUNT: 405 LINE COUNT: 00033

CPR : **the P stands for plumber's helper. (cardiopulmonary** resuscitation **)**
(letter to the editor)
Lurie, Keith G ...

TEXT:
CPR : The P Stands for Plumber's Helper To the Editor. -- Though novel methods of cardiac resusscitation exist, the traditional cardiopulmonary **resuscitation** (**CPR**) techniques recommended by the American Heart Association have a proven track record. [1] This is...

...collapsed in front of his family. He was unrousable. His son, poorly trained in traditional **CPR** , attemted to **ventilate** his father, but the patient did not respond. The son then attempted manual chest compression, but his father reportedly remained pulseless and **breathless** . The son then remenbered that his mother had **resuscitated** her husband 6 months earlier with a toilet plunger. Thus, the son ran upstairs, took...

...minutes until the paramedics arrived. By that time the patient had begun to move and **breath** on his own. He was found to be incontinent of urine, though no signs of...
... effective chest compressor, but the suction between the chest wall

and the plunger generated significant **negative pressure** and served to **ventilate** the patient as well. The son, delighted that his mother's toilet plunger technique had...

...all the beds in our coronary care unit. We recommended that he take a basic **CPR** course but had to admit that it's hard to argue with success.

Keith G. **Lurie** , MD Clinton Lindo, MD Jerome Chin, MD Medical Center University of California San Francisco

[1.] Standard's and guidelines dor cardiopulmonary **resuscitation** (**CPR**) and emergency cardiac care (ECC). JAMA. 1980;244:453-509.

...DESCRIPTORS: **CPR** (First aid

19901003

6/3,K/16 (Item 1 from file: 149)
DIALOG(R)File 149:TGG Health&Wellness DB(SM)

01766289 SUPPLIER NUMBER: 20581012 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Optimizing standard cardiopulmonary resuscitation **with an inspiratory impedance threshold valve.**
Lurie, Keith G. ; Mulligan, Katherine A.; McKnite, Scott; Detloff, Barry; Lindstrom, Paul; Lindner, Karl H
Chest, v113, n4, p1084(7)
April,
1998
PUBLICATION FORMAT: Magazine/Journal; Refereed ISSN: 0012-3692
LANGUAGE: English RECORD TYPE: Fulltext TARGET AUDIENCE: Professional
WORD COUNT: 3674 LINE COUNT: 00327

Optimizing standard cardiopulmonary resuscitation **with an inspiratory impedance threshold valve.**
Lurie, Keith G ...

TEXT:

...to assess whether intermittent impedance of inspiratory gas exchange improves the efficiency of standard cardiopulmonary **resuscitation** (**CPR**).

Background; Standard **CPR** relies on the natural elastic recoil of the chest to transiently decrease intrathoracic pressures and thereby promote venous blood return to the heart. To further enhance the **negative** intrathoracic **pressures** during the "relaxation" phase of **CPR** , we tested the hypothesis that intermittent impedance to inspiratory gases during standard **CPR** increases coronary perfusion pressures and vital organ perfusion.

Methods: **CPR** was performed with a pneumatically driven automated device in a porcine model of ventricular fibrillation. Eight pigs were randomized to initially receive standard **CPR** alone, while seven pigs initially received standard **CPR** plus intermittent impedance to inspiratory gas exchange with a threshold valve set to -40 cm (H.sub.2)O. The compression: **ventilation** ratio was 5:1 and the compression rate was 80/min. At 7-min intervals the impedance threshold valve (ITV) was either added or removed from the **ventilation** circuit such that during the 28 min of **CPR** , each animal received two 7-min periods of **CPR** with the ITV and two 7-min periods without the valve. Results: Vital organ blood flow was significantly higher during **CPR** performed with the ITV than during **CPR** performed without the valve. Total left ventricular blood flow (mean (+ or -) SEM) (mL/min/g...

...vital organ blood flow and coronary perfusion pressure.

Conclusions: Intermittent impedance to inspiratory flow of **respiratory** gases during standard **CPR** significantly improves **CPR** efficiency during ventricular fibrillation. These studies underscore the importance of lowering intrathoracic pressures during the relaxation phase of **CPR** . (CHEST 1998; 113:1084-90)

Key words: active compression-decompression **CPR** ; cardiac arrest; cardiopulmonary **resuscitation** ; heart; impedance threshold valve; ventricular fibrillation

Abbreviations: ACD=active compression-decompression; CPP=coronary perfusion pressure; **CPR** = cardiopulmonary **resuscitation** ; ITV=impedance threshold valve; NS=not significant

The potential value of increasing **negative** intrathoracic **pressure** during the decompression phase of cardiopulmonary **resuscitation** (**CPR**) with a new technique termed active compression-decompression (ACD) **CPR** has been described recently. 1-5 ACD **CPR** enhances the bellows-like action of the chest. Use of this method is associated with improved hemodynamic status in animal models and humans when compared with conventional manual **CPR** .(1-5) More recently, we demonstrated that the efficacy of ACD **CPR** could be further improved by insertion of an inspiratory impedance threshold valve (ITV) into the **respiratory** circuit.(6) In a porcine model of ventricular fibrillation, we observed that use of the ITV during ACD **CPR** , which physiologically mimics the clinical Mueller maneuver, lowers intrathoracic pressure during the decompression phase, thereby enhancing vital organ blood flow and lowering defibrillation energy requirements when compared with ACD **CPR** alone.(6) In the present study, we hypothesized that the use of an inspiratory impedance valve during standard closed-chest **CPR** , which also relies on the bellows-like action of the thorax, would enhance the **negative** intrathoracic **pressure** generated by the natural recoil of the chest during the decompression phase. As such, the...

...present investigation was to test this hypothesis by insertion of an inspiratory ITV into the **respir**atory circuit. We describe the measurements of central aortic pressures, coronary perfusion pressures, vital organ blood...

...induction of ventricular fibrillation, 5,000 U of sodium heparin was administered IV.

Closed-chest **CPR** was performed with a 6.5-cm circular compression pad positioned over the sternum. The...
...7100/66 computer; Apple Computer; Cupertino, Calif).(6)

The protocol was designed to compare standard **CPR** alone with standard **CPR** plus an inspiratory ITV. Each pig served as its own control. The experimental protocol is...termed "time 0." At this point, the pigs were assigned randomly to initially receive either **CPR** alone or **CPR** plus the ITV. The endotracheal tube (ET tube high-low JET, Mallinckrodt Inc; St. Louis) was immediately disconnected from the mechanical **ventilator** and the tube cuff pressure was assessed to ensure that it was adequate to seal the trachea. After 3 min of ventricular fibrillation, during which time no chest compressions or **ventilation** was performed, **CPR** was initiated with the automated device. The compression rate was 80/min with a 50...

...and that during the decompression phase the pad did not impede chest wall relaxation.(6)

Ventilatory support and automated standard **CPR** were performed simultaneously during **CPR** . **Ventilation** was provided by manual bag **ventilation** (Ambu bag; Glostrup, Denmark) and oxygen (8 L/min) as previously described.(3) **Ventilatory** support was continued throughout all experiments using manual bag **ventilation** with 10 L oxygen

supplementation. Hand-held **ventilation** was utilized after preliminary experiments showed that it was easier to interpose manual **ventilatory** efforts at the end of the decompression phase with the bag **ventilation** than with mechanical **ventilation** . Moreover, the mechanical **ventilators** available to us (including the Harvard animal **ventilator** (Harvard Apparatus; Dover, Mass) and the Siemens **ventilator** (Siemens; Munich Germany)), which we have previously used,(1,3,6) had a significant amount of resistance to inspiration. That inspiratory resistance prevented us from testing our overall hypothesis. During **CPR** , 1respirations were delivered continuously at a rate of 16/min (one **breath** every five chest compressions) at a constant tidal volume of approximately 450 mL. As previously described, **ventilations** were delivered during the decompression phase of **CPR** .(1,6)

The ITV in this study consisted of two 20 cm (H.sub.2)O threshold valves (Ambu Anesthesia **PEEP** Valve 20, No. 194011000; Ambu, Inc; Glostrup, Denmark) connected in series between the endotracheal tube...

...the Ambu bag such that during the decompression phase, but in the absence of manual **ventilation** , the valves opened only with greater than -40 cm (H.sub.2)O of inspiratory...

...than -40 cm (H.sub.2)O of intrathoracic pressure was required for inspiration of **respiratory** gases during four of every five compression cycles during performance of **CPR** with the ITV. With standard **CPR** and without active bag **ventilation** , use of these threshold valves in series resulted in effectively no inspiratory movement of **respiratory** gases during the decompression phase of **CPR** . As shown in the protocol time line, at 7-min intervals, the ITV was either added or removed from the **ventilation** circuit such that during the 28 min of **CPR** , each animal received two 7-min periods of **CPR** with the valve and two 7-min periods without the valve.

Once **CPR** alone or **CPR** plus the ITV was initiated, the same method was performed continuously for 7 min. Radiolabeled...

...values are expressed as mean (+ or -) SEM.

RESULTS

Seven pigs were randomized to initially receive **CPR** with the ITV and eight pigs received **CPR** initially without the ITV. There were no significant differences in the compression forces between groups...ITV.

(Figure 2 ILLUSTRATION OMITTED)

(TABULAR DATA 1 NOT REPRODUCIBLE IN ASCII)

During performance of **CPR** , there were no significant differences in aortic systolic pressure during the compression phase of **CPR** when the ITV was used (Table 1). Differences in the coronary perfusion pressures (CPPs) (diastolic...

...and Figs 3 and 2c (bottom)). The mean CPP during the entire 28 min of **CPR** tended to be higher during **CPR** with the ITV (14.8 (+ or -) 1.3) than during **CPR** without the ITV (12.5 (+ or -) 1.5; p=0.07).

(Figure 3 ILLUSTRATION OMITTED...

...yet statistically significant decrease in the CPP each time the ITV was removed from the **respiratory** circuit (Fig 2c (bottom)). In contrast, each time the ITV was added to the **respiratory** circuit, the mean CPP remained constant.

Use of the ITV during standard **CPR** also increased vital organ blood flow. The mean ventricular blood flow throughout the entire experiment was significantly higher during **CPR** +ITV than during **CPR** -ITV (+ITV, 0.32 (+ or -) 0.04; -ITV, 0.23 (+ or -) 0.03; p (is...

...with the measurement of the CPP, each time that the ITV was removed from

the **respiratory** circuit, there was a statistically significant decrease in the left ventricular blood flow within that...

...similar manner, the mean cerebral blood flow throughout the entire experiment was significantly higher during **CPR** with the valve when compared with no valve (+ITV, 0.23 (+ or -) 0.02; -ITV...
...02; p (is less than) 0.05). The cerebral blood flow was significantly higher during **CPR** with the ITV than without the ITV at two of the four time points (Fig...

...was also examined. The mean endocardial/epicardial ratio throughout the experiment was significantly higher during **CPR** with the ITV (0.95 (+ or -) 0.11) than without the ITV (0.81 (+ or...

...and 23 min, the pH was significantly higher in the group that started initially with **CPR** +ITV. Correspondingly, at 9 and 23 min, the P(CO.sub.2) was significantly lower in the group that started **CPR** +ITV.

DISCUSSION

Closed chest manual cardiac massage or standard **CPR** depends, in part, on the natural resilience of the chest wall to refill the heart with blood following each compression phase. This transient period of **negative** intrathoracic **pressure** is a critical aspect of any method of **CPR** . When the inflow of **respiratory** gases is impeded by an inspiratory threshold valve, equilibration of the **negative** intrathoracic **pressure** generated by the elastic recoil of the chest occurs to a greater extent by enhanced venous return and not by movement of **respiratory** gases. Results from the current study demonstrate that myocardial perfusion is increased by 40% during standard **CPR** in the presence of the ITV compared with standard **CPR** alone. The results further suggest that endocardial blood flow is increased with the use of the ITV. Overall, these results imply that insertion of an ITV into the **respiratory** circuit during standard **CPR** enhances the return of venous blood to the thoracic area. These findings are consistent with an earlier study in which the ITV was found to enhance the efficacy of ACD **CPR** .(6) Together, these investigations suggest that intermittent impedance to inspiration during a performance of any method of **CPR** , which relies at least in part on either passive or active elastic recoil of the chest wall to enhance venous return, should significantly increase overall **CPR** efficacy.

In this study, the beneficial effects of the ITV, as demonstrated by the prevention...

...decrease in the CPP or vital organ perfusion when the ITV was added to the **respiratory** circuit, were most pronounced each time the ITV was removed from the **respiratory** circuit (Fig 2). Given the similar measurements of vital organ blood flow and CPP obtained 2 min after initiation of **CPR** between both groups, these results suggests that other factors, in particular the initial profound neurohormonal...underestimate the potential benefit of the ITV. Moreover, they suggest that there is a minimum **negative** intrathoracic **pressure** threshold during the decompression phase that must be overcome, at which point myocardial perfusion increases in a nonlinear rate. In this fashion, the increase in **negative** intrathoracic **pressure** during the decompression phase appears to "afterload" the left and right heart, facilitating venous return...

...the arterioles and the interstitium, the relative rates of right heart filling at a given **negative** intrathoracic **pressure** , and the relative responsiveness of the arterial and venous tree to subtle shifts in maximal **negative** intrathoracic **pressure** .

Despite our current inability to fully understand the physiologic factors involved in enhancement of myocardial perfusion with the ITV, the

results highlight the potential value of maximizing efforts to decrease **negative** intrathoracic **pressure** during the decompression or "relaxation" phase of **CPR** to enhance overall venous return and ultimately cardiac perfusion and overall **CPR** efficacy. Increasing **negative** intrathoracic **pressures** during the decompression, in addition to efforts aimed at maximizing **positive** intrathoracic **pressures** during the compression phase, appears to be important when optimizing the potential mechanical benefits of...

...to increase systemic arterial pressures, augmentation of right heart filling is an essential part of **CPR** . Enhancement of right heart filling, though difficult to assess by measurement of the calculated CPPs... ...right ventricular infarction as well as during cardiac arrest. Based on the present study, maximizing **negative** intrathoracic **pressure** during the decompression phase of **CPR** appears to be an effective way to help increase right heart filling and overall venous return.

The potential value of enhancing of **negative** intrathoracic **pressure** during passive relaxation of the chest wall by the use of an ITV is highly...

...the heart and the compliance of the ventricular wall. Use of an impedance valve during **CPR** serves to "prime the pump" and is one of several new techniques available to enhance venous return to the heart during cardiac arrest and **CPR** . Although venous return during "optimal" mechanical **CPR** may be provided by the combination of the ITV and ACD **CPR** ,(6) the present study suggests that even in the absence of new **CPR** techniques, the ITV holds potential promise to improve the efficacy of standard **CPR** .

ACKNOWLEDGMENT: The authors would like to thank Gail Rosenbaum for her assistance in preparing this...

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...American Heart Association.

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DESCRIPTORS: Cardiac **resuscitation** --
19980400

6/3,K/17 (Item 2 from file: 149)
DIALOG(R)File 149:TGG Health&Wellness DB(SM)

01743388 SUPPLIER NUMBER: 19931529 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Nonpharmacologic treatment of atrial fibrillation: current and evolving strategies.
Iskos, Demosthenes; Fahy, Gerard J.; **Lurie, Keith G.** ; Sakaguchi, Scott; Adkisson, Wayne O.; Benditt, David G
Chest, v112, n4, p1079(12)
Oct,
1997
PUBLICATION FORMAT: Magazine/Journal; Refereed ISSN: 0012-3692
LANGUAGE: English RECORD TYPE: Fulltext TARGET AUDIENCE: Professional
WORD COUNT: 8723 LINE COUNT: 00750

... **Lurie, Keith G**
... of overt accessory pathways. Am J Cardiol 1992; 69:493-97
(78) Guidelines for cardiopulmonary **resuscitation** and emergent cardiac care: recommendations of the 1992 National Conference. JAMA 1992; 268:2211-13...
19971000

6/3,K/18 (Item 3 from file: 149)
DIALOG(R)File 149:TGG Health&Wellness DB(SM)

01570531 SUPPLIER NUMBER: 18423303
Vasopressin administration in refractory cardiac arrest.
Lindner, Karl H.; Prengel, Andreas W.; Brinkmann, Alexander; Strohmenger, Hans-Ulrich; Lindner, Ingrid M.; **Lurie, Keith G.**
Annals of Internal Medicine, v124, n12, p1061(4)
June 15,
1996
PUBLICATION FORMAT: Magazine/Journal ISSN: 0003-4819 LANGUAGE: English
RECORD TYPE: Abstract TARGET AUDIENCE: Professional

... **Lurie, Keith G.**

ABSTRACT: Injecting vasopressin may prove to be a promising new technique during cardiopulmonary **resuscitation** when other measures fail. Vasopressin has been shown to work better than epinephrine, the standard...

...arrest. Doctors injected vasopressin in eight cases of cardiac arrest where prolonged efforts at cardiopulmonary **resuscitation** using standard techniques had failed. All incidents occurred within the hospital and in all but one, **resuscitation** was initiated within one minute of cardiac arrest. Five patients died, including two patients who...

DESCRIPTORS: **CPR** (First aid...
19960615

6/3,K/19 (Item 4 from file: 149)
DIALOG(R)File 149:TGG Health&Wellness DB(SM)

01495168 SUPPLIER NUMBER: 15842419 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Active compression-decompression CPR improves vital organ perfusion in a dog model of ventricular fibrillation.

Chang, Mark W.; Coffeen, Paul; **Lurie, Keith G.** ; Shultz, Jeffrey; Bache, Robert J.; White, Carl W

Chest, v106, n4, p1250(10)
Oct,
1994
PUBLICATION FORMAT: Magazine/Journal ISSN: 0012-3692 LANGUAGE: English
RECORD TYPE: Fulltext TARGET AUDIENCE: Professional
WORD COUNT: 6861 LINE COUNT: 00582

Active compression-decompression CPR improves vital organ perfusion in a dog model of ventricular fibrillation.

... **Lurie, Keith G**

TEXT:

Objectives: This study was designed to assess whether a new method of cardiopulmonary **resuscitation** (**CPR**), termed active compression-decompression **CPR** , or ACD- **CPR** , improves organ perfusion when compared with standard (S) **CPR** in a dog model of ventricular fibrillation.

Background: ACD- **CPR** has recently been shown to improve hemodynamic and **respiratory** parameters during cardiac arrest when compared with standard **CPR** . However, to our knowlege, the effects of ACD- **CPR** on tissue perfusion have not been investigated.

Methods: Ventricular fibrillation was induced in eight anesthetized, intubated animals. ACD- **CPR** and standard **CPR** were each performed twice in alternating order. All interventions were preceded by 1 min of ventricular fibrillation, in which no **CPR** was performed, and consisted of 6 min of **CPR** with either technique during which tissue perfusion was measured. Compressions were performed at 80/min...

...chest wall for both techniques. Epinephrine was administered at the beginning of each 6-min **CPR** interval. Hemodynamic monitoring of aortic and right atrial pressure was performed continuously and myocardial, cerebral...

...3 [+ or -] 55.5 ml/min/100 g, respectively (mean [+ or -] SEM). Compared with standard **CPR** , ACD- **CPR** resulted in higher global left ventricular (22.5 [+ or -] 6.2 vs 14.1 [+ or...

...the frontal, parietal, and occipital lobes of the brain were all significantly improved by ACD- **CPR** . Aortic systolic (61.7 [+ or -] 4.1 vs 49.5 [+ or -] 3.1 mm Hg...

...pressure (12.9 [+ or -] 3.4 vs 10.4 [+ or -] 3.4 mm Hg, ACD- **CPR** vs standard **CPR** , $p < 0.01$) were all higher during ACD- **CPR** than during standard **CPR** .

Conclusions: We conclude that ACD- **CPR** improves tissue perfusion and systemic hemodynamics compared with standard **CPR** .

(Chest 1994; 106:1250-59) ACD- **CPR** = active compression-decompression cardiopul- monary **resuscitation** ; S = standard

Key words: cardiopulmonary **resuscitation** ; cerebral blood flow; hemodynamics; left ventricular blood flow; renal blood flow

The standard method of cardiopulmonary **resuscitation** (S- **CPR**) has undergone few changes since its introduction by Kouwenhoven et al(1) more than three decades ago. Despite its nearly universal acceptance, the number

of patients who benefit from S- **CPR** is small (<20 percent), probably secondary to inadequate blood flow during **resuscitative** efforts.(2)(3)(4) While newer methods of **CPR** designed to enhance tissue perfusion have been investigated,(5)(6)(7)(8)(9)(10)(11...

...15)(16) at present there is insufficient evidence to warrant changes in current clinical S- **CPR** techniques. Recently, Lurie et al(15) described a patient who was successfully **resuscitated** using an ordinary bathroom plunger during **CPR** . This anecdotal report has stimulated the development of a new method of **CPR** using a handheld suction device which, when applied to the chest surface, allows active decompression as well as compression of the chest wall. Recent studies using active compression-decompression (ACD) **CPR** in humans during cardiac arrest demonstrated improvements in hemodynamic and **respiratory** parameters during ACD- **CPR** compared with S- **CPR** .(16)(17) To date, and to our knowledge, the effects of ACD- **CPR** on tissue perfusion have not been investigated. This study was designed to compare regional organ blood flows achieved with ACD- **CPR** and S- **CPR** , and to gain new insights into the basic mechanisms by which active decompression of the chest wall might improve **CPR** hemodynamics.

METHODS

Preparation

This study was approved by the University of Minnesota Committee on Animal...

...administered as needed during surgery. Dogs were intubated with a 6-F endotracheal tube and **ventilated** with 10 L of supplemental oxygen at a minute **ventilation** required to maintain arterial pH between 7.3 and 7.4. Arterial blood gas monitoring was performed every 30 min to ensure adequacy of **ventilatory** parameters. The chest was shaved and animals were placed in the supine position until immediately...

...Oxnard, Calif) referenced to the level of the right atrium. For analysis of hemodynamics during **CPR** with each technique, data were acquired at the end of each minute of each intervention...end-expiration during compression (systole) and decompression (diastole) were averaged for six compressions over two **respiratory** cycles. Mean aortic and right atrial pressures were obtained electronically; 5,000 U of heparin was given IV prior to initiation of the study.

CPR Techniques

Both S- **CPR** and ACD- **CPR** were performed using a hand-held modified household plunger (internal diameter, 8 cm) shown schematically...

...compressions. For each experiment, a new suction device was used to ensure adequate suction. Standard **CPR** was defined as compression and release with no suction adherence of the plunger to the chest, thus allowing passive relaxation of the chest wall to resting position. During S- **CPR** only, suction was prevented by placing two 10 x 10-cm gauze pads between the chest wall and the suction cup. ACD- **CPR** was defined as compression and active withdrawal of the plunger with adequate suction to actively decompress the chest wall to an anteroposterior diameter approximately 10 percent beyond normal resting position. **CPR** was performed with the dogs in the left lateral oblique (45[degrees]) position. Compressions were...

...duty cycle. To ensure that the force of compressions was equal during both methods of **CPR** , two monitoring systems with continuous feedback to the person applying compressions were used. Direct measurements...

...designed to allow the comparison of tissue flows and hemodynamics during

multiple periods of ACD- **CPR** and S- **CPR** in the same animal. It was modeled in part from previous studies of **CPR** in animals by the Hopkins group(18) in which a short period of no **CPR** and relatively high-dose epinephrine were used. In each of seven dogs, both ACD- **CPR** and S- **CPR** were performed twice, 6 min per intervention, in alternating order. In one dog, ACD- **CPR** and S- **CPR** were each performed once. Each round of **CPR** was preceded by 1 min during which no **CPR** was performed. Using this experimental design, hemodynamic and organ blood flow measurements during each method of **CPR** were made twice in the same animal. Thus, comparison of tissue flows achieved with the two **CPR** techniques could be made with each animal serving as its own control.

Before cardiac arrest...

...adjusted as needed to maintain mean right atrial pressure at 3 to 8 mm Hg. **Ventilatory** support was continued throughout all experiments using manual bag **ventilation** with 10 L oxygen supplementation. Hand-held **ventilation** was utilized after preliminary experiments showed that it was easier to interpose manual **ventilatory** efforts at the end of the decompression phase with bag **ventilation** than with mechanical **ventilation** . **Respirations** were delivered at a rate of 16/min (one **breath** every five chest compressions) at a constant tidal volume required to maintain the same minute **ventilation** delivered during surgical preparation. Ventricular fibrillation was induced by a single 5-s application of...

...with the endocardium of the right ventricle. After 1 min of fibrillation, during which no **CPR** or **ventilation** was performed, either ACD- **CPR** or S- **CPR** was initiated. The decision to use S- **CPR** or ACD- **CPR** was made randomly at the beginning of each experiment. In four dogs, S- **CPR** was performed first, and in four dogs, ACD- **CPR** was performed first. Epinephrine was administered using a protocol similar to that of Michael et ...

...18) with a bolus (1 mg) directly into the left ventricle at the onset of **CPR** , followed by a continuous infusion (8 [micro]g/kg/min) into the right atrium throughout the remaining 27 min of the experiment. The first **CPR** method (either S- **CPR** or ACD- **CPR**) was continued for 6 min during which blood flows and hemodynamics were measured. After 5...

...assess residual counts in the ventricle at the end of the intervention. After 6 min, **CPR** was stopped. After 1 min of no **CPR** and no **ventilation** , the alternate **CPR** technique was performed for 6 min. At the onset of this second round of **CPR** , a repeat bolus of epinephrine (1 mg) was administered into the left ventricle. Hemodynamic and...

...first intervention. In seven experiments, this cycle of 1 min of ventricular fibrillation with no **CPR** and 6 min of **CPR** was repeated two additional times alternating the two techniques for each intervention, for a total of four **CPR** interventions per dog. In one experiment, only two interventions were performed.

Tissue Flow Measurements

Regional...

...15-[micro]m-diameter microspheres with techniques similar to those previously reported and validated during **CPR** in ...Studies have shown that tissue flows can be accurately measured within 1 min of instituting **CPR** and that peripheral blood flow and tissue perfusion remain relatively steady throughout the entire duration of **CPR** up to 50 min.(4)(18) For each intervention, approximately 2 x [10.sup.6...

...minute in the reference blood samples. The two determinations of tissue

blood flow for each **CPR** intervention were then averaged to provide a single value for S- **CPR** and ACD- **CPR** for each animal.

Statistical Analysis

All values are expressed as mean values [+ or -] SEM. Statistical...

...0 [+ or -] 5.5 ml/min/100 g. Left ventricular flow during either method of **CPR** was significantly lower than during the baseline period ($p < 0.01$). However, during ACD- **CPR**, left ventricular flow (22.5 [+ or -] 6.2 ml/min/100 g) was significantly greater than during S- **CPR** (14.1 [+ or -] 2.1 ml/min/100 g, $p < 0.01$, ACD- **CPR** vs S- **CPR**).

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Average baseline total brain flow was 14.2 [+ or -] 2.1 ml/min/100 g. During S- **CPR**, the flow was 8.5 [+ or -] 2.3 ml/min/100 g (significantly lower than...

...this value increased to 12.0 [+ or -] 2.4 ml/min/100 g during ACD- **CPR** ($p < 0.01$, ACD- **CPR** vs S- **CPR** flows). The difference between ACD- **CPR** and baseline brain blood flow was not statistically significant ($p = 0.24$). Renal cortical flow fell dramatically during **CPR** with average flows of 476.3 [+ or -] 55.5 ml/min/100 g during baseline, 17.5 [+ or -] 5.0 ml/min/100 g during S- **CPR**, and 27.8 [+ or -] 5.0 ml/min/100 g during ACD- **CPR** ($p < 0.05$, ACD- **CPR** vs S- **CPR** flows). Thus, when compared with S- **CPR**, ACD- **CPR** resulted in a significant increase in total left ventricular perfusion, cerebral perfusion, and renal cortical flow. Furthermore, ACD- **CPR** resulted in cerebral blood flows that were statistically equivalent to baseline values.

Global mean left ventricular and cerebral blood flows were significantly greater during ACD- **CPR** than during S- **CPR** in each of the eight individual experiments. As shown in Figure 2, organ flows were improved with ACD- **CPR** throughout a broad range of measured flows. These differences were statistically significant in each experiment (p [less than or equal to] 0.02 ACD- **CPR** vs S- **CPR**). Thus, whether tissue flows during **resuscitation** in an individual experiment were low or high, ACD- **CPR** resulted in greater perfusion than S- **CPR**. In the kidney, flow was improved with ACD- **CPR** in five of the seven animals ($p < 0.02$). In one experiment, renal cortical flows were no different between the two techniques, and in another, flow during S- **CPR** was higher than during ACD- **CPR**. In one experiment, renal blood flow was below the limit of detection with both ACD- **CPR** and S- **CPR**.

Improvement in organ perfusion seen with ACD- **CPR** is further supported by the time course of recovery of microsphere activity from the circulation...

...peak recovery of counts in the peripheral blood was the same for both methods of **CPR**, occurring 1.5 min after injection ...into the left ventricle. However, microspheres appeared more rapidly in the peripheral blood during ACD- **CPR** than during S- **CPR**. At 1.0 min after injection, 25.4 [+ or -] 6.8 percent of all counts recovered were seen with ACD- **CPR** vs 14.6 [+ or -] 5.3 percent during S- **CPR** ($p = 0.02$). After peak recovery, microspheres were also cleared from the peripheral circulation significantly faster with ACD- **CPR** than with S- **CPR**. With ACD- **CPR**, 13.1 [+ or -] 2.4 percent and 6.5 [+ or -] 1.9 percent of total...

...percent and 9.2 [+ or -] 1.6 percent at the same time points during S- **CPR** ($p < 0.05$, both time points). Taken together, these clearance data are consistent with a significantly higher peripheral blood flow state during ACD- **CPR** than during S- **CPR** and are consistent with the organ blood flow data discussed above.

Regional Tissue Perfusion

In addition to total organ blood flow, regional tissue perfusion was also significantly improved with ACD- **CPR** compared with S- **CPR** . Regional organ flow in the heart and brain are shown in Table 1. Epicardial, midmyocardial, and endocardial left ventricular flows were all significantly improved with ACD- **CPR** compared with S- **CPR** . During ACD- **CPR** , regional flows to the epicardium and mid-myocardium were >40 percent of baseline levels while flow to the endocardium reached nearly 30 percent of baseline. In contrast, during S- **CPR** , epicardial and midmyocardial flows were <30 percent of baseline and endocardial flows were only 16...

...flows decreased from 1.76 at baseline to 0.92 ($p<0.02$) during ACD- **CPR** and to 0.79 ($p<0.01$) during S- **CPR** . While the endocardial/epicardial ratio was greater during ACD- **CPR** compared with S- **CPR** , this difference was not statistically significant ($p=0.20$). In the brain, ACD- **CPR** resulted in flows to the frontal, parietal, and occipital lobes to nearly 85 percent of baseline levels, while flows during S- **CPR** reached only 60 percent of baseline.

Hemodynamics and Blood Gas Values

The hemodynamic data from these experiments are summarized in Table 2. Compared with S- **CPR** , ACD- **CPR** resulted in significantly higher aortic systolic and aortic mena pressures. Systolic right atrial and mean right atrial pressures were also significantly higher during ACD- **CPR** than during S- **CPR** . In contrast, there were no significant differences between diastolic aortic and diastolic right atrial pressures during **CPR** with the two techniques. Myocardial perfusion pressure, computed for each experiment as the diastolic aortic pressure minus the diastolic right atrial pressure, was significantly greater during ACD- **CPR** than during S- **CPR** . Left ventricular microsphere flow correlated with myocardial perfusion pressure for both ACD- **CPR** ($r=0.845$, $p<0.01$) and S- **CPR** ($r=0.811$, $p<0.02$).

[TABULAR DATA OMITTED]

Representative hemodynamic data acquired during ACD- and S- **CPR** are shown in Figure 4. Simultaneously recorded force of compression and intrathoracic pressure tracings are...

...force of compression and similar peak intraesophageal pressure, aortic systolic pressures are higher with ACD- **CPR** than with S- **CPR** . Furthermore, during active decompression, somewhat greater **negative pressures** within the esophagus are achieved, suggesting increased **negative** intrathoracic **pressures** were generated with ACD- **CPR** . Also worth noting is the difference in the right atrial pressure tracings during diastole with...

...right atrial pressure appears to reach its nadir earlier and remain lower than with S- **CPR** for a greater proportion of diastole, despite similar duty cycles for the two techniques.

A...

...28 blood gas samples taken during the last minute of baseline measurements and of each **CPR** intervention were analyzed from six of the eight experiments. Table 3 reveals there were no significant differences in the arterial blood gas data during ACD- **CPR** compared with S- **CPR** and that animals were adequately oxygenated throughout the experiment. When compared with baseline, animals were significantly more acidotic during S- **CPR** but not during ACD- **CPR** . During **CPR** with either technique, animals were significantly more hypocapneic than during baseline.

[TABULAR DATA OMITTED]

Validation...

...radiolabeled microspheres in this acute model of ventricular fibrillation and to assess differences in ACD- **CPR** vs S- **CPR** , peripheral

clearance of microspheres was estimated by dividing the corrected counts obtained in each of...

...peripheral circulation by 3 min following their injection into the left ventricle during baseline, S- **CPR** , and ACD- **CPR** . The raw counts recovered from the left ventricle 5.5 min after initiation of each...

...These data suggest that adequate ejection of microspheres from the ventricle had occurred during both **CPR** techniques. These findings are consistent with previous work that validated the microsphere technique for measuring blood flow during **CPR** .(4)

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The data in this study represent means of values obtained during separate **CPR** interventions within individual experiments. It is possible that differences in blood flows seen with ACD- **CPR** vs S- **CPR** were affected by the particular time frame in a given experiment during which the intervention...

...of our model during the course of an experiment, mean flows achieved with both ACD- **CPR** and S- **CPR** early in each of the experiments (ie, the first two interventions) were compared with mean...

...Table 4). Also, the absolute differences and percentage of change in flows achieved with S- **CPR** and ACD- **CPR** early ...the model remained relatively stable throughout the experiments. Furthermore, the absolute differences in mean ACD- **CPR** and S- **CPR** flows remained constant throughout the experiment, suggesting that compared with S- **CPR** , ACD- **CPR** improved flows by a constant magnitude that was independent of time. Therefore, mean ACD- **CPR** tissue flows and hemodynamic parameters for the early and late periods were compared with mean S- **CPR** flows and hemodynamics.

[TABULAR DATA OMITTED]

DISCUSSION

This study demonstrates that compared with S- **CPR** , ACD- **CPR** improves blood flow to three vital organs and significantly improves systemic blood pressure in a...

...well as systolic blood pressure and calculated myocardial perfusion pressure were all improved with ACD- **CPR** . Despited wide variations in basal organ flow, improvements in flows to the heart and brain were seen with ACD- **CPR** in each of eight individual experiments that comprise this study.

The measured myocardial flow during S- **CPR** was comparable to that observed in previous reports.(4)(18) However, myocardial flows of 20 to 25 ml/min/100 g tissue, higher than those observed with S- **CPR** in this study, may be necessary to meet the heart's metabolic needs during ventricular fibrillation.(22) Previous authors suggest that flows during prolonged **CPR** of at least 10 to 20 percent of baseline are necessary for successful defibrillation and...

...are accurate, both the higher absolute flows and percentage of baseline flows achieved with ACD- **CPR** in our study suggests that ACD- **CPR** may provide a significant advantage over S- **CPR** in overcoming these critical threshold values.

The brain is extremely sensitive to anoxic insult with...

...patients demonstrate normal electroencephalograms and somatosensory-evoked potentials.(25)(26) In this study during ACD- **CPR** , cerebral blood flows averaged nearly 80 percent of baseline flows. These levels of perfusion during ACD- **CPR** were statistically equivalent to

baseline brain flows. In contrast, S- **CPR** resulted in 60 percent of baseline flows. Taken together, the significant increase in cerebral flows achieved with ACD- **CPR** over S- **CPR** might be important with regard to the potential recovery of neurologic function following a period of **CPR** .

The minimal metabolic requirements of the kidney are less well documented than for the heart...

...Blood flow is preferentially shunted from the kidney during ventricular fibrillation. Renal blood flow during **CPR** in the range of 1 percent of baseline values has been a consistent finding in...

...is comparable to those found previously. It is unlikely that the significant differences in ACD- **CPR** vs S- **CPR** renal blood flow during ventricular fibrillation would provide a greater chance of preserving renal function...
...after arrest.

The exact mechanisms responsible for improvement in organ flow and hemodynamics with ACD- **CPR** remain unclear. Indeed, the mechanisms by which circulation is sustained during S- **CPR** continues to be the subject of debate. Kouwenhoven et al(1) proposed that blood flow...

...significant laboratory data also support the thoracic pump theory, which suggests that blood flow during **CPR** is a result of a generalized increase in intrathoracic vascular pressures that is transmitted to...

...atrial pressure gradient occur predominantly during the relaxation phase of the chest compression cycle of **CPR** . Halperin et al(31) were able to demonstrate that myocardial flows depended on diastolic myocardial...

...significantly with alterations in intrathoracic pressures.

In this study, we have demonstrated that during ACD- **CPR** there is an improvement in myocardial perfusion pressure leading to greater myocardial flows during ACD- **CPR** (Tables 1 and 2). The tracings shown in Figure 4 suggest that the right atrial pressure during decompression in ACD- **CPR** remains lower for a greater duration than during S- **CPR** . This difference may be important and may account for the improvement in calculated myocardial perfusion...
...indirect measure of intrathoracic pressure, reveals a marked decrease in pressure during active decompression (greater **negative** intrathoracic **pressure**) with ACD- **CPR** (Fig 4). To our knowledge, demonstration of intrathoracic pressure alterations with ACD- **CPR** has not been reported previously. In preliminary studies, we have evaluated the effect of ACD- **CPR** on phasic coronary flow velocity. These studies reveal that peak late diastolic flow velocity during decompression is markedly augmented during ACD- **CPR** vs S- **CPR** .(34)

[CHART OMITTED]

Based on these results, we speculate that ACD- **CPR** improves organ flow and systemic hemodynamics predominantly by increasing **negative** intrathoracic **pressure** during active decompression. The improvement in the aortic-to-right atrial pressure gradient and blood...intrathoracic pressure. Furthermore, during active decompression, the compliant thoracic venous bed is subjected to greater **negative** **pressure** both in duration and in magnitude. The resultant increase in the arterial to venous gradient ...

...and pressures during compression. Further studies investigating the underlying mechanisms of organ perfusion during ACD- **CPR** are the focus of our current laboratory efforts.

Limitations

A large variance in absolute organ flow was noted during both methods

of **CPR** . This is likely due to variations in the efficacy of either method of **CPR** secondary to differences in the canine chest configuration from animal to animal as they affect...

...and decompression. Substantial variations in organ blood flow are commonly reported in animal studies of **CPR** . In our study, the use of paired observations in the same animal, each performed twice...

...The hypocarbia seen during the basal state, which was more pronounced during both methods of **CPR** , may be, in part, responsible. However, since baseline renal and myocardial blood flow are comparable...

...methodologic considerations regarding microsphere blood flow measurements. Furthermore, the measured vital organ flows during S- **CPR** in this study are comparable to those seen in previous reports using similar S- **CPR** techniques.(4)(18) The dose of epinephrine used in these studies was selected following the...

...regard are different from those of Lindner et al(35) in swine in which ACD- **CPR** was not shown to have beneficial effects on organ blood flow when utilized with high...
...investigation is the assumption that the systolic phases of compression were similar with the two **CPR** techniques. In this study, a hand-held compressive device was utilized. Preliminary studies convinced us that this method of chest compression more closely modeled the clinical application of **CPR** than the mechanical "thumper." We attempted to assure equal systolic compression with both techniques by...

...31)(36) Using constant monitoring, these parameters were kept as equal as possible. Both S- **CPR** and ACD- **CPR** were subjected to identical methods of data analysis. Given these considerations, we believe it is unlikely that the improvement seen in organ flows and hemodynamics with ACD- **CPR** in this study is due to differences in systolic compressive force.

Finally, application of results of a **CPR** study in an animal model to the clinical setting is limited, primarily due to differences...

...animals and humans. Chest dimensions are known to be important determinants of the effects of **CPR** on hemodynamics and organ flows.(2)(33)(37) The canine chest configuration is not ideal...

...may yield even better hemodynamic and myocardial perfusion results. Certainly, any alterations in currently accepted **CPR** techniques must be supported by proven benefits in the laboratory setting.

CONCLUSIONS

ACD- **CPR** is a novel method of **CPR** . Based on this study, we conclude that ACD- **CPR** significantly improves vital organ perfusion and systemic blood pressure during **CPR** in a dog model of ventricular fibrillation. The mechanism by which ACD- **CPR** improves blood flow and **CPR** hemodynamics remains speculative, but it is likely due to the development of greater **negative** intrathoracic **pressure** during active decompression resulting in the active transport of greater blood volumes into the thoracic cavity and right side of the heart. Clinically relevant issues such as whether ACD- **CPR** leads to improved recovery of organ function or facilitates the return of spontaneous circulation following a period of **CPR** are currently ongoing in prehospital studies. We believe that further studies designed to evaluate these outcomes using this novel method of **CPR** , both in animal models and in the clinical setting, are warranted.

ACKNOWLEDGMENTS: The authors would...

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RECORD TYPE: Abstract TARGET AUDIENCE: Professional

... **Lurie, Keith**

...ABSTRACT: checking, defaulting to the stim-T sensor if the sensors are at odds. A minute **ventilation** and piezoelectric activity sensor combination is marketed under the name Legend Plus. Studies of the...
19941215

6/3,K/21 **(Item 1 from file: 444)**
DIALOG(R)File 444:New England Journal of Med.

00116987

The Critically Ill Cardiac Patient: Multisystem dysfunction and management. Edited by Vladimir Kvetan and David R. Dantzker. 417 pp., illustrated. Philadelphia, Lippincott-Raven, 1996. $125. ISBN 0-397-51465-4 (Book Reviews)

Lurie, Keith G.
The New England Journal of Medicine
Jun 26, **1997** ; 336 (26),p 1920
LINE COUNT: 00048 WORD COUNT: 00666

Lurie, Keith G.
1997 ;

TEXT
...presentation makes a complex subject easy to comprehend. Another fine chapter describes the use of **ventilatory** support in patients with cardiac failure. In some ways this chapter is more theoretical than others, although it discusses novel methods of **ventilatory** support for the critically ill -- for example, continuous **positive** airway **pressure** for the treatment of heart failure in patients without sleep apnea. Similarly solid contributions are...

...patients in the intensive care unit have serious cardiac arrhythmias and may ultimately require cardiopulmonary **resuscitation** , the next edition of this book would benefit from chapters on the recognition and management of common, serious cardiac arrhythmias and advances in cardiopulmonary **resuscitation** . In addition, points made in the book are no longer supported by the current literature...

...teaching tool and reference for physicians who manage cardiac disease in the intensive care unit.| **Keith** G. **Lurie** , M.D.University of MinnesotaMinneapolis, MN 55455

6/3,K/22 **(Item 1 from file: 129)**
DIALOG(R)File 129:PHIND(Archival)

00657518
CardioPump trial shows better results in heart attack
Clinica 899 p19, March 13, 2000 (**20000313)**
STORY TYPE: F WORD COUNT: 326

..., **20000313)**

A cardiopulmonary **resuscitation** (**CPR**) technique that combines a one-way valve and a hand-held suction device can maintain...

...reported in a previous study that patients treated with the CardioPump suction device alone during **CPR** (made by Danish company Ambu International) had a 5% one-year survival rate and 6...

...discharge.
This is compared with 2% for both endpoints in the group treated with conventional **CPR** at the scene. However the American Heart Association warned that the device was not effective...

...in 1998.

Adding a valve increases the efficiency of active compression-decompression (ACDC), said Dr **Keith Lurie** , of the University of Minnesota Medical School. The **Resusci** -Valve impedance threshold valve has a silicone diaphragm that decreases the pressure in the chest during decompression. It fits between the **ventilation** bag and the face mask or endotracheal tube of a standard manual **resuscitation** bag.

In a study involving 21 patients, 10 had ACDC **CPR** without the valve and 11 with it. Four patients with the vatve returned to spontaneous...

6/3,K/23 (Item 1 from file: 135)
DIALOG(R)File 135:NewsRx Weekly Reports

0000044914 (USE FORMAT 7 OR 9 FOR FULLTEXT)
Technique and Valve Improve CPR
Heart Disease Weekly, March 22, 2000, p.9-10

DOCUMENT TYPE: Expanded Reporting LANGUAGE: English
RECORD TYPE: FULLTEXT
WORD COUNT: 592

Technique and Valve Improve CPR

TEXT: A cardiopulmonary **resuscitation** (**CPR**) technique using devices developed at the University of Minnesota Medical School has been shown in ...

The method improves upon active compression-decompression (ACD) **CPR** , which is performed with a hand-held plunger-like device called the CardioPump. With this...

...of the chest to the brain and other organs during compression, just as in standard **CPR** . Unlike standard **CPR** , the pump actively pulls the chest back to its original position during decompression. It improves...

...study by a group that included the authors of the Circulation article showed that ACD **CPR** significantly improved long-term survival rates among patients who had cardiac arrest outside the hospital...

...19, 1999, New England Journal of Medicine .
The latest study introduced a valve to ACD **CPR** . During **CPR** the chest works like a bellows, and the valve improves the function of the bellows...

...greater vacuum effect, which pulls more blood back into the heart and thus improves overall **CPR** efficacy.
The study involved 21 patients, 10 who had ACD **CPR** without the valve, 11 with it. More patients returned to spontaneous circulation with (n=4...
...arrest had near-normal blood pressures for up to 30 minutes or until

they were **resuscitated** . The mean blood pressure in the patients during **CPR** was 109/56. Normal pressure is about 120/80.

"These results are exciting," said Dr. **Keith Lurie** , associate professor of medicine in the division of cardiology at the university and co-developer...

...ability to maintain near-normal blood pressures with these new and simple mechanical devices during **CPR** , we should be able to **resuscitate** more patients who would otherwise not have a chance."

Lurie co-wrote the article with...

...States ever survive to hospital discharge, due in part to the inherent inefficiency of standard **CPR** ," Lurie said.

During standard **CPR** , the heart and brain get less than 30% of normal blood flow. With ACD **CPR** plus the valve, those organs get more than 60% of normal flow. The group will conduct further studies to determine the long-term benefits of this new **CPR0** technology.

This article was prepared by Heart Disease Weekly editors from staff and other reports.

SUBJECT HEADING: Cardiopulmonary **Resuscitation**

2000

```
Set     Items   Description
S1         72   AU=(LURIE K? OR LURIE, K? OR MENK V? OR MENK, V? OR ZIELIN-
               SKI T? OR ZIELINSKI, T? OR BIONDI J? OR BIONDI, J?)
S2        594   CPR OR (CARDIOPULMON? OR CARDIO()PULMON?)(W)(RESUSCIT? OR -
               RESPIRAT? OR VENTILAT? OR CIRCULAT?)
S3       2365   PEEP OR PEP OR POSITIVE()(ASSIST? OR PRESSUR?)(2N)(BREATH?
               OR VENTILAT? OR RESPIRAT?) OR POSITIVE()END()EXPIR?()PRESSURE
               OR (MEDICAL OR EMT OR FIRE)(2N)RESCUE?
S4     597304   VACUUM? OR SUCTION? OR NEGATIVE()PRESSURE? OR EXTRACT?(3N)-
               (POSITIVE OR RESPIRAT? OR EXPIRAT? OR EXHAL?)
S5     207631   BAG OR BAGS OR SACK? ? OR SMARTBAG? OR SMART()BAG OR AMBUB-
               AG? OR AMBU OR POUCH?? OR BELLOW?
S6     691641   MANIPULAT? OR DECOMPRESS? OR COMPRESS?
S7      48505   THORAX? OR THORAC? OR CHEST??? OR LUNG? ? OR PULMON? OR IN-
               TRATHORA?
S8        220   VENOUS(2N)(RETURN OR CIRCULAT?) OR (BLOODFLOW? OR BLOOD()F-
               LOW? OR BLOOD()CIRCULAT?)(2N)(RETURN? OR BACK)(2N)(HEART? OR -
               CARDIAC?) OR LOWER?()PRESSUR?(2N)(RIGHT()ATRIUM) OR LOWER?()P-
               RESSUR?(2N)(THORAX? OR THORAC?)()VENA()CAVA
S9     778002   VALVE??? OR VALVING
S10     24310   HYPOTENS? OR HYPOTENT? OR LOW()BLOOD()PRESSURE OR HEAD()(T-
               RAUMA? OR INJUR?) OR CARDIAC()ARREST OR HEART()ATTACK OR MYOC-
               ARD?()INFARCT? OR (HEMORRHAG? OR HAEMORRHAG?)()SHOCK? OR BLOO-
               D()LOSS??
S11   4081951   METHOD? ?
S12   2984682   SYSTEM? ?
S13    221806   TECHNIQUE? ?
S14    198434   PROCEDURE? ?
S15   2416756   PROCESS??
S16    145914   IC=(A62B? OR A61G? OR A61M?)
S17        90   S2:S3 AND S5
S18         0   S17 AND S8
S19         3   S2:S3 AND S8
S20         3   S17 AND S4
S21        28   S17 AND S9
S22        28   S21 AND (S6:S7 OR S10:S16)
S23         1   S17 AND S1
S24        33   S19:S23
S25        33   IDPAT (sorted in duplicate/non-duplicate order)
? show files
File 347:JAPIO Nov 1976-2003/Dec(Updated 040402)
         (c) 2004 JPO & JAPIO
File 350:Derwent WPIX 1963-2004/UD,UM &UP=200431
         (c) 2004  Thomson Derwent
?
```

25/3,K/1 **(Item 1 from file: 350)**
DIALOG(R)File 350:Derwent WPIX

016157247 **Image available**
WPI Acc No: 2004-315134/200429
XRPX Acc No: N04-251070
Respiratory valve **apparatus used in endotracheal medical** procedure , **has channel is aligned with access port and endotracheal tube connection port to receive** suction **catheter in either first or second** valve **assembly position**
Patent Assignee: BAYRON H (BAYR-I); WINTHROP N (WINT-I)
Inventor: BAYRON H; WINTHROP N
Number of Countries: 100 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 20040069308	A1	20040415	US 2002267383	A	20021009	200429	B
WO 200434946	A2	20040429	WO 2003US32588	A	20031009	200429	

Priority Applications (No Type Date): US 2002267383 A 20021009
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20040069308	A1		12	A61M-016/00	
WO 200434946	A2	E		A61H-000/00	

Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SK SL TJ TM TN TR TT TZ UA UG UZ VC VN YU ZA ZM ZW
Designated States (Regional): AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IT KE LS LU MC MW MZ NL OA PT RO SD SE SI SK SL SZ TR TZ UG ZM ZW

Respiratory valve **apparatus used in endotracheal medical** procedure , **has channel is aligned with access port and endotracheal tube connection port to receive** suction **catheter in either first or second** valve **assembly position**

Abstract (Basic):
... aligned with an access port and an endotracheal tube connection port (18) to receive a **suction** catheter in either a first **valve** assembly position or a second **valve** assembly position. A reciprocating **valve** assembly (11) reciprocates to open a resuscitation **bag** connection port (28) and close a respirator connection port (32).
... Used in endotracheal medical **procedure** .
...
...or insertion of catheter from sanitary self-contained enclosure. Offers compact, inexpensive and simple respiratory **valve** . Allows uninterrupted respiratory switch-over to resuscitation **bag** to maintain optimal ventilation. Prevents loss of **positive end expiratory pressure** in **lungs** . Prevents collapse of **lungs** . Prevents contact contamination of **valve** . Provides spring bias in reciprocating **valve** . Can connect different resuscitation **bags** .
...

...The figure shows the partial cross-sectional view of a respiratory **valve** assembly...

...Reciprocating **valve** assembly (11...

...Resuscitation **bag** connection port (28
...Title Terms: **VALVE** ;
...International Patent Class (Main): **A61M-016/00**

25/3,K/2 (Item 2 from file: 350)
DIALOG(R)File 350:Derwent WPIX

015310415 **Image available**
WPI Acc No: 2003-371349/200335
Related WPI Acc No: 1995-193914; 1996-433571; 2000-421466; 2002-139260; 2002-641994; 2002-681034; 2003-030322; 2003-310772; 2003-766762
XRAM Acc No: C03-098421
XRPX Acc No: N03-296207

Increasing blood circulation in breathing person, involves interfacing valve system to airway to decrease respiratory gas flow to lungs and permitting person to inhale and exhale through system

Patent Assignee: CPRX LLC (CPRX-N)
Inventor: LURIE K G
Number of Countries: 001 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20030037784	A1	20030227	US 93149203	A	19931109	200335 B
			US 95403009	A	19950310	
			US 97950702	A	19971015	
			US 2000546252	A	20000410	
			US 2001854238	A	20010511	
			US 2002119203	A	20020408	
			US 2002224263	A	20021105	
US 20040016428	A9	20040129	US 93149203	A	19931109	200413
			US 95403009	A	19950310	
			US 97950702	A	19971015	
			US 2000546252	A	20000410	
			US 2001854238	A	20010511	
			US 2002119203	A	20020408	
			US 2002224263	A	20021105	

Priority Applications (No Type Date): US 2002224263 A 20021105; US 93149203 A 19931109; US 95403009 A 19950310; US 97950702 A 19971015; US 2000546252 A 20000410; US 2001854238 A 20010511; US 2002119203 A 20020408
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20030037784	A1		54	A61M-016/00	CIP of application US 93149203
					CIP of application US 95403009
					CIP of application US 97950702
					CIP of application US 2000546252
					CIP of application US 2001854238
					CIP of application US 2002119203
					CIP of patent US 5441658
					CIP of patent US 5692498
					CIP of patent US 6062219
US 20040016428	A9			A61M-016/00	CIP of application US 93149203
					CIP of application US 95403009
					CIP of application US 97950702
					CIP of application US 2000546252
					CIP of application US 2001854238
					CIP of application US 2002119203
					CIP of patent US 5441658
					CIP of patent US 5692498
					CIP of patent US 6062219
					CIP of patent US 6526973
					CIP of patent US 6604523

Abstract (Basic):
... the VS. During inhalation, the VS is produces a vacuum within

the thorax to increase **blood flow back** to the right **heart** , increasing cardiac output and blood circulation.

... to improve and sustain the duration of negative intrathoracic pressure and improve blood oxygenation and **cardiopulmonary circulation** .

25/3,K/7 (Item 7 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2004 Thomson Derwent. All rts. reserv.

013249583 **Image available**
WPI Acc No: 2000-421466/200036
Related WPI Acc No: 1995-193914; 1996-433571; 2002-139260; 2002-641994; 2002-681034; 2003-030322; 2003-310772; 2003-371349; 2003-766762
XRPX Acc No: N00-314350

Apparatus and methods **for assisting** cardiopulmonary resuscitation **that incorporates a transition tube, which connects the endotracheal tube to the ventilation** bag , **the ventilation** valve **serves to introduce air into the device**

Patent Assignee: CPRX LLC (CPRX-N)
Inventor: GOLD B; LURIE K G; SWEENEY M
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 6062219	A	20000516	US 93149204	A	19931109	200036 B
			US 95403009	A	19950310	
			US 97950702	A	19971015	

Priority Applications (No Type Date): US 97950702 A 19971015; US 93149204 A 19931109; US 95403009 A 19950310
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6062219	A		23	A62B-009/02	CIP of application US 93149204 CIP of application US 95403009 CIP of patent US 5551420 CIP of patent US 5692498

Apparatus and methods **for assisting** cardiopulmonary resuscitation **that incorporates a transition tube, which connects the endotracheal tube to the ventilation** bag , the ventilation valve **serves to introduce air into the device**
...Inventor: **LURIE K G**

Abstract (Basic):
... The device (35) for impeding airflow into a patients **lungs** . The device consists an endotracheal tube (36), which is placed into the patients trachea and...

...passageway. Connected is a transition tube (38), which connects the endotracheal tube to the ventilation **bag** (28). The ventilation **valve** (26) serves to introduce air into the device. Attached or connected to the transition tube is an airflow responsive **valve** (24). The inflow **valve** is biased so that it opens when the negative **intrathoracic** pressure in the patients **chest** reaches a threshold amount.
... External **chest compression** and **decompression** as part of the **cardiopulmonary resuscitation procedures** .
...

...Responsive **valve** (24...

...Ventilation **valve** (26
...Title Terms: **METHOD** ;
International Patent Class (Main): **A62B-009/02**
International Patent Class (Additional): **A61M-016/00** ...

... **A62B-007/10**

25/3,K/8 (Item 8 from file: 350)
DIALOG(R)File 350:Derwent WPIX

013238175 **Image available**
WPI Acc No: 2000-410049/200035
Related WPI Acc No: 1996-392259; 1996-424248; 1997-132229; 1998-158486
XRPX Acc No: N00-306303
Resuscitator bag **exhaust port with CO2 indicator that incorporates a regulator assembly that has a port for connecting to the** bag
Patent Assignee: NELLCOR PURITAN BENNETT INC (NELL-N)
Inventor: COLBURN J; GOOD R J
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 6058933	A	20000509	US 96729618	A	19961010	200035 B
			US 9855093	A	19980403	

Priority Applications (No Type Date): US 9855093 A 19980403; US 96729618 A 19961010
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6058933	A		11	A62B-009/02	CIP of application US 96729618 CIP of patent US 5749358

Resuscitator bag **exhaust port with CO2 indicator that incorporates a regulator assembly that has a port for connecting to the** bag

Abstract (Basic):
... A regulator assembly (50) has a port (52) for connecting to a resuscitator **bag** , and a port (54) for connecting to a patient. Port includes a tubular lumen (56), which extends into an exhaust housing (58). A one-way **valve** (60) seals off exhaust assembly, when air is forced from the **bag** through a slit one way **valve** to the patient. The exhaust port is configured to accept a **Positive End Expiratory Pressure** (**PEEP**) **valve** , and therefore has a **PEEP** port (62) in addition to an exhaust port.
... A resuscitator **bag** exhaust port with CO2 indicator...

...One-way **valve** (60...

... **PEEP** port (62
...Title Terms: **BAG** ;
International Patent Class (Main): **A62B-009/02**

25/3,K/9 (Item 9 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2004 Thomson Derwent. All rts. reserv.

012588260 **Image available**
WPI Acc No: 1999-394367/199933
XRPX Acc No: N99-294750
Residual pressure controller in piston ventilator, bellow **type ventilator for hospitals and health care centers**
Patent Assignee: NELLCOR PURITAN BENNETT (NELL-N)
Inventor: BAILEY E; JONES M B; LURA D B
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 5918597	A	19990706	US 987426	A	19980115	199933 B

Priority Applications (No Type Date): US 987426 A 19980115
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 5918597	A		10	A61M-016/00	

Residual pressure controller in piston ventilator, bellow **type ventilator for hospitals and health care centers**

Abstract (Basic):
... The pressure sensor (98) coupled with patient circuit (20), senses the pressure and **positive end expiratory pressure** (**PEEP**) and produces the corresponding signal. The controller receives the **PEEP** signal, compares with the target pressure and operates the **PEEP valve** (22) to vent gas selectively from the signal duct (91). The **PEEP** is altered to achieve target pressure.
... Patient circuit for delivering gas from piston and cylinder assembly, has an exhalation **valve** (24) connected to the **PEEP valve** by signal duct. The **PEEP valve** transmits a pneumatic signal for positioning the exhalation **valve** . An INDEPENDENT CLAIM is also included for **method** of providing breathable gas to patient...

...In piston ventilator and **bellow** type ventilator for controlling the residual pressure in patient's **lungs** during exhalation, for hospitals and health care centers...

...Monitors **PEEP** and regulates the exhalation **valve** to increase or decrease the resistance to exhalation phase of the patient's breath, permitting...

...sinusoidal flow of breathable gas by monitoring and controlling the amount of oxygen. The exhalation **system** permits pneumatic rather than mechanical control of the exhalation **valve** .
...

...The figure shows the scheme of piston ventilator **system** .
...

... **PEEP valve** (22...

...Exhalation **valve** (24
...Title Terms: **BELLOWS** ;
International Patent Class (Main): **A61M-016/00**

25/3,K/10 (Item 10 from file: 350)
DIALOG(R)File 350:Derwent WPIX

011929943 **Image available**
WPI Acc No: 1998-346853/199830
XRAM Acc No: C98-107057
XRPX Acc No: N98-270730
Bag - valve **resuscitator attachment, for emergency and rescue work - has injection and nebuliser ports extending laterally from central housing, allowing emergency administration of medications through pre-filled syringes**
Patent Assignee: COATES D F (COAT-I); COATES M R (COAT-I)
Inventor: COATES D F; COATES M R
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 5762063	A	19980609	US 97861145	A	19970521	199830	B

Priority Applications (No Type Date): US 97861145 A 19970521
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 5762063	A		6	A62B-009/04	

Bag - valve **resuscitator attachment, for emergency and rescue work...**

...Abstract (Basic): A medication introducing device is for connection between a **bag - valve** mask apparatus used for pre-hospital emergency respiratory assistance and the upper portion of an endo-tracheal tube (24) in a patient undergoing **CPR** whose condition requires the administering of medications and when an intravenous line cannot be established...

...comprises a central housing (14) having an upper opening configured for airtight connection to the **bag - valve** mask apparatus, and a lower opening configured for airtight connection to the endo-tracheal tube...

...lower opening so that medications can be administered to the patient without disconnection of the **bag - valve** mask apparatus and the concomitant interruption of **CPR** .
...

...USE - For emergency and rescue work where cardiac **pulmonary** resuscitation (**CPR**) is required...

...ADVANTAGE - Allows administration of cardiac medications without interruption of **CPR** . Compact is size, is easy to easily connected between **bag - valve** mask and endo-tracheal tube
Title Terms: **BAG** ;
International Patent Class (Main): **A62B-009/04**
International Patent Class (Additional): **A61M-016/10**

25/3,K/15 **(Item 15 from file: 350)**
DIALOG(R)File 350:Derwent WPIX

009047363 **Image available**
WPI Acc No: 1992-174734/199221
XRPX Acc No: N92-131755
Resuscitator having directional control valve **assembly - assembly includes housing including first cylindrical part secured to squeeze** bag **and having partial floor across it**
Patent Assignee: SPECIALITY PACKAGING LICENSING (SPEC-N); SPECIALTY PACKAGING (SPEC-N)
Inventor: DALEIDEN J P
Number of Countries: 005 Number of Patents: 006
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 5109840	A	19920505	US 91655642	A	19910214	199221	B
GB 2252734	A	19920819	GB 922229	A	19920203	199234	
DE 4204159	A	19920820	DE 4204159	A	19920213	199235	
FR 2672807	A1	19920821	FR 921955	A	19920214	199242	
SE 9200421	A	19920815	SE 92421	A	19920213	199243	
GB 2252734	B	19940615	GB 922229	A	19920203	199421	

Priority Applications (No Type Date): US 91655642 A 19910214
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 5109840	A		7		
GB 2252734	A		21	A61M-016/20	
DE 4204159	A		7	A61M-016/00	
GB 2252734	B		5	A61M-016/20	
FR 2672807	A1			A61M-016/20	
SE 9200421	A			A61M-016/00	

Resuscitator having directional control valve **assembly**...

...**assembly includes housing including first cylindrical part secured to squeeze** bag **and having partial floor across it**

...Abstract (Basic): In the resuscitation device a squeeze **bag** is provided which includes a check **valve** to ensure one-way flow into the **bag** from outside room air or through an oxygen feed/reservoir **system** as known in the prior art. Also provided is a directional control **valve** assembly communicating with the **bag** and comprising a housing including a first cylindrical part secured to the **bag** and having a partial floor across it, the floor being formed with a perpendicular threaded...

...A tubular patient prt is joined to the domed part of the **valve** housing and adapted to be coupled in gas flow communication to the patient. The patient port extending into the **valve** housing and including a tubular extension formed concentric with the **valve** housing and having a circular end seat. A unitary flexible duck-billed diaphgram **valve** is provided including a flexible outer normally flat peripheral portion and an inner duck-bill...

...USE/ADVANTAGE - A **PEEP** **valve** which is integral with the resuscitation **bag** directional control **valve** **system** . It is more convenient, less costly and potentially more therapeutically effective than other devices...

...Abstract (Equivalent): A resuscitator which comprises a flexible squeeze **bag** having a one-way inlet **valve** for admitting air and/or oxygen to

the **bag** and a directional control **valve** assembly which permits air or oxygen to be forced under pressure to the patient, while allowing the patient to exhale through an outlet, wherein the directional control **valve** assembly includes an adjustable **PEEP** **valve** within a housing, wherein said assembly comprises a first tubular sleeve, associated with an exit port from said **bag** , which is threadably engaged with a second tubular sleeve associated with said housing, said housing...

...oxygen to the patient and a second passageway for exhausting exhaled air, a one-way **valve** located within said assembly and arranged to permit air and/or oxygen flow from said exit port through said first passageway, said one-way **valve** including a peripheral flange biased to close onto a seat against the patient's exhalation...

...variable by screwing said first sleeve relatively to the second sleeve to thereby vary the **PEEP** correspondingly...

...Title Terms: **VALVE** ;

International Patent Class (Main): **A61M-016/20**

...International Patent Class (Additional): **A62B-007/04** ...

... **A62B-009/02**

25/3,K/21 (Item 21 from file: 350)
DIALOG(R)File 350:Derwent WPIX

004358052
WPI Acc No: 1985-184930/198531
XRPX Acc No: N85-138858
Respirator static pressure monitoring unit - has exhalation air passage leading to discharge valve **opening at predetermined pressure**
Patent Assignee: ITOH SEIKI KK (ITOH-N)
Inventor: ITOH K
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
DE 3447019	A	19850725	DE 3447019	A	19841222	198531	B

Priority Applications (No Type Date): JP 843128 A 19840113
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
DE 3447019	A		12		

... **has exhalation air passage leading to discharge** valve **opening at predetermined pressure**

...Abstract (Basic): is for a closed-circuit respirator, i.e. of the regenerative type. From the exhalation **system** leading from the mask (1) to a cleaning canister (7) there branches off an exhalation...

...so as to weaken the dynamic pressure dependent on respiration. This leads to a discharge **valve** (16) for the static pressure, opening when the latter exceeds a predetermined **valve** .
...

...The passage can comprise a hose (13) from the exhalation **system** and connected to a **bag** (14) of elastic material, also a pipe (15) of smaller ID than the hose...

...USE - For **rescue** and **fire** fighting work, avoiding excess pressure rise.
...Title Terms: **VALVE** ;
International Patent Class (Additional): **A62B-007/02**

25/3,K/24 (Item 24 from file: 350)
DIALOG(R)File 350:Derwent WPIX

004132346
WPI Acc No: 1984-277886/198445
XRPX Acc No: N84-207454
Manual resuscitation apparatus - has first valve **allowing forced respiration, free exhalation and spontaneous breathing to take place**
Patent Assignee: INSPIRON CORP (INSP-N); INTERTECH RESOURCES INC (INTE-N)
Inventor: COOK W F
Number of Countries: 004 Number of Patents: 005
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
GB 2139099	A	19841107	GB 8311439	A	19830504	198445	B
DE 3416350	A	19841108	DE 3416350	A	19840503	198446	
GB 2139099	B	19861126	GB 8411439	A	19840504	198648	
CA 1220111	A	19870407				198718	
US 4774941	A	19881004	US 86941573	A	19861211	198842	

Priority Applications (No Type Date): US 83491572 A 19830504; US 85766673 A 19850816
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
GB 2139099	A		5		

... **has first** valve **allowing forced respiration, free exhalation and spontaneous breathing to take place**

...Abstract (Basic): The resuscitation appts. comprises a squeeze **bag** with a gas inlet and a gas outlet, and a specifically configured **valve** (30,32) joined to the **bag** over the gas outlet. The **valve** housing (18) includes a squeeze **bag** port (39) in flow communication with the gas outlet opening, a patient port (36) and...

...The **valve** disposed in the housing includes a portion (30a) for directing fluid from the squeeze **bag** through the patient port during inhalation or forced respiration and through the exhalation port during exhalation. Another portion (30b) of the **valve** closes off the exhalation port during inhalation or forced respiration such that fluid from the squeeze **bag** is directed to the patient...

...USE - The resuscitator is used during medical **procedures** .

...Abstract (Equivalent): A resuscitation apparatus comprising: (a) hollow squeeze **bag** means having first and second ends defining, respectively, first and second openings in flow communications with the interior thereof; (b) a first **valve** housing in confined flow communication with and joined to the squeeze **bag** means adjacent the first opening in the first end thereof, said first **valve** housing having a tubular squeeze **bag** port in flow communication with said squeeze **bag** means, a tubular patient port located adjacent said squeeze **bag** port and defining an annular **valve** seat, and an exhalation port having a tubular section which extends outwardly from the patient...

...said ports being in selective flow communication with one another through the interior of said **valve** housing; (c) first diaphragm **valve** means disposed in said first **valve** housing adjacent to and for selective engagement with said annular **valve** seat, said first diaphragm **valve** means serving for controlling the flow of fluid to

and from a patient and comprising (i) one-way **valve** portion means for directing fluid to pass only from said squeeze **bag** port through said patient port during inhalation, and (ii) sealing portion means annularly disposed about said **valve** seat and extending, during inhalation, at least partially into the annular section of the exhalation port beyond said **valve** seat, said sealing portion means serving for preVenting fluid to pass through said exhalation port during inhalation and forced respiration, such that fluid from said squeeze **bag** port is directed through said first **valve** housing, said first **valve** means and said patient port to the patient; and (d) a second **valve** means in confined flow communication with and joined to the squeeze **bag** means adjacent the second opening in the second end thereof, said second **valve** means serving for allowing fluid to pass only into said squeeze **bag** means.

...Abstract (Equivalent): The device comprises a squeeze **bag** having a gas inlet and a gas outlet, and a **valve** joined to the **bag** over the gas outlet. The **valve** housing includes a squeeze **bag** port in flow communication with the gas outlet opening, a patient port and an exhalation...

...The **valve** disposed in the housing includes a portion for directing fluid from the squeeze **bag** through the patient port during inhalation or forced respiration and through the exhalation port during exhalation. Another portion of the **valve** closes off the exhalation port during inhalation or forced respiration such that fluid from the squeeze **bag** is directed to the patient...

...USE - Resuscitation apparatus for use during medical **procedures** . esp. during **cardio - pulmonary resuscitation** .

(

...Title Terms: **VALVE** ;

International Patent Class (Additional): **A61M-016/00** ...

... **A62B-007/04**

25/3,K/25 (Item 25 from file: 350)
DIALOG(R)File 350:Derwent WPIX

003982959
WPI Acc No: 1984-128503/198421
XRPX Acc No: N84-095087
Breathing appliance for narcosis inhalation - has bellow **in bottle automatic** system **and hand operated ventilation** bag **for automatic and manual ventilation**
Patent Assignee: JEHMLICH K (JEHM-I); VEB KOMB MED LABORTECH LEIPZIG (MEDZ)
Inventor: HEYMANN P; STIEGLER F
Number of Countries: 004 Number of Patents: 005
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
DE 3329604	A	19840517	DE 3329604	A	19830817	198421	B
HU 32732	T	19840928				198443	
DD 218731	A	19850213				198524	
CS 8307449	A	19851216				198609	
DE 3329604	C	19910627				199126	

Priority Applications (No Type Date): DD 244800 A 19821112
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
DE 3329604	A		19		

... **has** bellow **in bottle automatic** system **and hand operated ventilation** bag **for automatic and manual ventilation**

...Abstract (Basic): The **bellow** in bottle automatic **system** and the hand-operated ventilation **bag** form components of a circuit which also has a control for frequency and breathing time...

...switch-off delay with a multi-function switch. The switching unit, which comprises a switching **valve** with its associated hand-operated ventilator **bag** and an exhalation **valve** with **PEEP valve** is connected through a third converter with the **bellow** in bottle **system** and to a connection of an ether circuit component...

...Abstract (Equivalent): artificial respiration unit is for anaesthesia respiration with automatic and manual respiration. An artificial respiration **system** has a **bellows** and a housing for automatic operation and a hand respiration **bag** (2) for manual operation. A changeover circuit shifts from automatic to manual. The **system** (1) circuit has a control (3) equipped for frequency and breathing time relationships is provided with a changeover unit (4), consisting of a changeover **valve** (11) with the **bag** (2) and an exhaling **valve** (12) with a **PEEP valve** . The control signal input (S) of the **valve** (11) is fed to a 1st binary DC voltage-pressure converter (5...

...The control signal input (S) of the **valve** (12) is fed to a 2nd binary DC voltage-pressure converter (6) which is connected...

...A further connection is made to the breathing gas connection (10) and the gas flow **valve** (22) across the **system** (1). The control signal input (S) on the output side is connected to a 3rd...

...Title Terms: **BELLOWS** ;
International Patent Class (Additional): **A61M-016/00** ...

... **A61M-017/00**

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25/3,K/26 (Item 26 from file: 350)
DIALOG(R)File 350:Derwent WPIX
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003371462
WPI Acc No: 1982-M9494E/198239
Manually-actuable cardio - pulmonary resuscitator - **has** bellows **mounted on patient's** chest **and coupled** endotracheal tube by valve
Patent Assignee: PHYSIO CONTROL CORP (PHYS-N)
Inventor: ALFERNESS C A
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 4349015	A	19820914				198239 B

Priority Applications (No Type Date): US 80206576 A 19801114
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 4349015	A		8		

Manually-actuable cardio - pulmonary resuscitator - ...

...**has** bellows **mounted on patient's** chest **and coupled endotracheal tube by** valve
...Abstract (Basic): The **bellows** is placed on the **chest** of a patient and includes a closed chamber which is coupled by a conduit and a **valve** to an airway inserted into the patient's airway, and by a second **valve** and a conduit to an inflatable bladder forming part of an abdominal restraint secured about the patient's body. As the **bellows** is **compressed** the first **valve** couples the gas being expelled from the **bellows** into the patient's **lungs** .
...

...The patient's **intrathoracic** pressure is increased due to the combination of the manual force applied to the patient's **chest** through the **bellows** and the pressure generated in the patient's **lungs** . When the **bellows** is being **decompressed** following the removal of manual force, the **valve** couples gas from the patient's **lungs** and from the atmosphere back to the **bellows** .

...Title Terms: **PULMONARY** ;

25/3,K/27 (Item 27 from file: 350)
DIALOG(R)File 350:Derwent WPIX

003270862
WPI Acc No: 1982-B8845E/198208
Breathing apparatus with intermittent forced breathing facility - has valve **combination including** positive end - expiratory pressure **type glass dome** valve
Patent Assignee: JEHMLICH K (JEHM-I); VEB MEDIZINTECH LEIPZIG (MEDZ)
Inventor: JEHMLICH K; MUELLER R
Number of Countries: 002 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
DE 3104325	A	19820218				198208 B
DD 155685	A	19820630				198243

Priority Applications (No Type Date): DD 221964 A 19800619
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
DE 3104325	A		12		

... **has** valve **combination including** positive end - expiratory pressure **type glass dome** valve
...Abstract (Basic): The breathing appts provides intermittent forced breathing by using existing equipment of ordinary breathing **systems** . This is achieved by employing a **valve** combination in the inspiration line which links a pressure/volume/time-control unit, via a three way junction with a breathing **bag** and a regulator **valve** and flowmeter respectively...

...A **valve** combination which includes positive endexpiratory pressure **valve** in the inspiration line is linked via a three way junction. This has a breathing **bag** on the one hand and a regulator **valve** and a flow meter on the other.
...Title Terms: **VALVE** ;
...International Patent Class (Additional): **A61M-016/00**

```
Set     Items   Description
S1         47   AU=(LURIE K? OR LURIE, K? OR MENK V? OR MENK, V? OR ZIELIN-
              SKI T? OR ZIELINSKI, T? OR BIONDI J? OR BIONDI, J?)
S2       2609   CPR OR (CARDIOPULMON? OR CARDIO()PULMON?)(W)(RESUSCIT? OR -
              RESPIRAT? OR VENTILAT? OR CIRCULAT?) OR MANUAL?()RESUSC? OR E-
              MERGENCY()MEDICAL?
S3       6397   PEEP OR PEP OR POSITIVE()(ASSIST? OR PRESSUR?)(2N)(BREATH?
              OR VENTILAT? OR RESPIRAT?) OR POSITIVE()END()EXPIR?()PRESSURE
              OR (MEDICAL OR EMT OR FIRE)(2N)RESCUE?
S4     254253   VACUUM? OR SUCTION? OR NEGATIVE()PRESSURE? OR EXTRACT?(3N)-
              (POSITIVE OR RESPIRAT? OR EXPIRAT? OR EXHAL?)
S5      85564   BAG OR BAGS OR SACK? ? OR SMARTBAG? OR SMART()BAG OR AMBUB-
              AG? OR AMBU OR POUCH?? OR BELLOW?
S6     436953   MANIPULAT? OR DECOMPRESS? OR COMPRESS?
S7      95888   THORAX? OR THORAC? OR CHEST??? OR LUNG? ? OR PULMON? OR IN-
              TRATHORA?
S8     195291   VALVE??? OR VALVING
S9      25685   HYPOTENS? OR HYPOTENT? OR LOW()BLOOD()PRESSURE OR HEAD()(T-
              RAUMA? OR INJUR?) OR CARDIAC()ARREST OR HEART()ATTACK OR MYOC-
              ARD?()INFARCT? OR (HEMORRHAG? OR HAEMORRHAG?)()SHOCK? OR BLOO-
              D()LOSS??
S10    365290   WIRELESS? OR WIRE()LESS? OR REMOTE? OR RADIO? OR TRANSPOND?
              OR TELECOMMUNICAT?
S11   1308838   METHOD? ?
S12   1143438   SYSTEM? ?
S13    575888   TECHNIQUE? ?
S14    446770   PROCEDURE? ?
S15   1016995   PROCESS??
S16     39696   IC=(A62B? OR A61G? OR A61M?)
S17      1058   VENOUS(2N)(RETURN OR CIRCULAT?) OR (BLOODFLOW??? OR BLOOD(-
              )FLOW??? OR BLOOD()CIRCULAT?)(2N)(RETURN? OR BACK)(2N)(HEART?
              OR CARDIAC?) OR LOWER?()PRESSUR?(2N)(RIGHT()ATRIUM) OR LOWER?-
              ()PRESSUR?(2N)(THORAX? OR THORAC?)()VENA()CAVA
S18        72   S2:S3(10N)S5
S19        49   S18 AND S8
S20         8   S19 AND S17
S21        16   S19 AND S10
S22        49   S19 AND (S11:S15 OR S16 OR S9 OR S4 OR S6:S7)
S23        49   S19:S22
S24        49   IDPAT (sorted in duplicate/non-duplicate orde
? show files
File 348:EUROPEAN PATENTS 1978-2004/May W01
         (c) 2004 European Patent Office
File 349:PCT FULLTEXT 1979-2002/UB=20040513,UT=20040506
         (c) 2004 WIPO/Univentio
?
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PAT LIT

FULL TEXT FILES

SELECTED EDITED HITS

24/3,K/5 (Item 5 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00804856
CPR DEVICE HAVING STRUCTURE FOR INCREASING THE DURATION AND MAGNITUDE OF NEGATIVE INTRA- THORACIC **PRESSURE**
HERZ-LUNGEN-WIEDERBELEBUNGSEINRICHTUNG MIT DER MOGLICHKEIT ZUM ERHOHEN DER DAUER UND DES BETRAGES DES NEGATIVEN INNEREN THORAXDRUCKS
DISPOSITIF DE REANIMATION CARDIO- PULMONAIRE **A STRUCTURE AUGMENTANT LA DUREE ET L'INTENSITE D'UNE PRESSION INTRA-** THORACIQUE **NEGATIVE.**
PATENT ASSIGNEE:
CPRX, LLC., (4268230), 7615 Golden Triangle Drive, Suite A, Technology Park #5, Eden Prairie, MN 55344, (US), (Proprietor designated states: all)
INVENTOR:
BURIE, Keith G., 4751 Girard Avenue South, Minneapolis, MN 55409, (US)
SWEENEY, Michael, 1525 Goodrich Avenue, St. Paul, MN 55105, (US)
GOLD, Barbara, 4751 Girard Avenue South, Minneapolis, MN 55409, (US)
LEGAL REPRESENTATIVE:
Sanderson, Michael John et al (35592), MEWBURN ELLIS York House 23 Kingsway, London WC2B 6HP, (GB)
PATENT (CC, No, Kind, Date): EP 898485 A1 990303 (Basic)
EP 898485 A1 990512
EP 898485 B1 030502
WO 96028215 960919
APPLICATION (CC, No, Date): EP 96905523 960216; WO 96US2097 960216
PRIORITY (CC, No, Date): US 403009 950310
DESIGNATED STATES: DE; FR; GB; IT; SE
INTERNATIONAL PATENT CLASS: **A62B-007/00** ; **A62B-009/02** ; **A61M-016/04** ; **A61M-016/20**
NOTE:
No A-document published by EPO
LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	200318	1103
CLAIMS B	(German)	200318	1185
CLAIMS B	(French)	200318	1195
SPEC B	(English)	200318	9175
Total word count - document A			0
Total word count - document B			12658
Total word count - documents A + B			12658

CPR DEVICE HAVING STRUCTURE FOR INCREASING THE DURATION AND MAGNITUDE OF NEGATIVE INTRA- THORACIC **PRESSURE**
... **LUNGEN-WIEDERBELEBUNGSEINRICHTUNG MIT DER MOGLICHKEIT ZUM ERHOHEN DER DAUER UND DES BETRAGES DES NEGATIVEN INNEREN** THORAXDRUCKS
DISPOSITIF DE REANIMATION CARDIO- PULMONAIRE **A STRUCTURE AUGMENTANT LA DUREE ET L'INTENSITE D'UNE PRESSION INTRA-** THORACIQUE **NEGATIVE.**
INTERNATIONAL PATENT CLASS: **A62B-007/00** ...

... **A62B-009/02** ...

... **A61M-016/04** ...

... **A61M-016/20**
LEGAL STATUS (Type, Pub Date, Kind, Text):
...Advanced Circulatory **Systems** , Inc. (4475370) 7615 Golden Triangle Drive, Suite A, Eden Prairie, Minnesota 55344

US

Application...

...SPECIFICATION THE INVENTION

1. Field of the Invention

The present invention relates generally to devices and **methods** used in conjunction with external **chest compression** and **decompression** as a part of cardiopulmonary resuscitation **procedures** . In particular, the present invention relates to devices and **methods** for increasing cardiopulmonary circulation induced by **chest compression** and **decompression** when performing cardiopulmonary resuscitation.

Worldwide, sudden **cardiac arrest** is a major cause of death and is the result of a variety of circumstances, including heart disease and significant trauma. In the event of a **cardiac arrest** , several measures have been deemed to be essential in order to improve a patient's ...

...possible to at least partially restore the patient's respiration and blood circulation. One common **technique** , developed approximately 30 years ago, is an external **chest compression technique** generally referred to as cardiopulmonary resuscitation (CPR). CPR **techniques** have remained largely unchanged over the past two decades.

With traditional CPR, pressure is applied to a patient's **chest** in order to increase **intrathoracic** pressure. An increase in **intrathoracic** pressure induces blood movement from the region of the heart and **lungs** towards the peripheral arteries. Such pressure partially restores the patient's circulation. Traditional CPR is performed by actively **compressing** the **chest** by direct application of an external pressure to the **chest** . After active **compression** , the **chest** is allowed to expand by its natural elasticity which causes expansion of the patient's **chest** wall. This expansion allows some blood to enter the cardiac chambers of the heart. The **procedure** as described, however, is insufficient to ventilate the patient. Consequently, conventional CPR also requires periodic ventilation of the patient. This is commonly accomplished by mouth-to-mouth **technique** or by using positive-pressure devices, such as a self-inflating bag which relies on...

...mask, endotracheal tube or other artificial airway.

In order to increase cardiopulmonary circulation induced by **chest compression** , a **technique** referred to as active **compression - decompression** (ACD) has been developed. According to ACD **techniques** , the active **compression** phase of traditional CPR is enhanced by pressing an applicator body against the patient's **chest** to **compress** the **chest** . Such an applicator body is able to distribute and apply force substantially evenly over a portion of the patient's **chest** . More importantly, however, the applicator body is sealed against the patient's **chest** so that it may be lifted to actively expand the patient's **chest** during the **decompression** step. The resultant negative **intrathoracic** pressure induces venous blood to flow into the heart and **lungs** from the peripheral venous vasculature of the patient.

Also of importance to the invention are ventilation sources that are used in connection with CPR **techniques** to properly ventilate the patient. One type of ventilation source is the AMBU bag available from AMBU International, Copenhagen, Denmark. The **AMBU bag** can also be used in connection with a **positive end - expiratory pressure** (**PEEP**) **valve** , available from **AMBU** International, to treat some patients with **pulmonary** and cardiac diseases. However, until the present invention, a positive end-expiratory pressure **valve** in connection with

a ventilation source has not been used with any CPR **techniques** .

With both traditional CPR and ACD-CPR **techniques** , an increase in the amount of venous blood flowing into the heart and **lungs** from the peripheral venous vasculature would be desirable to increase the volume of oxygenated blood leaving the **thorax** during the subsequent **compression** phase. It would therefore be desirable to provide improved **methods** and apparatus for enhancing venous blood flow into the heart and **lungs** of a patient from the peripheral venous vasculature during both conventional CPR and ACD-CPR **techniques** . It would be particularly desirable to provide **techniques** which would enhance oxygenation and increase the total blood return to the **chest** during the **decompression** step of CPR and ACD-CPR, more particularly of ACD-CPR. This can be accomplished according to the present invention by augmentation of both negative and positive **intrathoracic** pressure, thereby amplifying the total **intrathoracic** pressure swing. An invention for providing this crucial improvement is described.

2. Description of the Background Art

ACD-CPR **techniques** are described in detail in Todd J. Cohen et al., Active **Compression - Decompression** Resuscitation: A Novel **Method** of Cardiopulmonary Resuscitation, American Heart Journal, Vol. 124, No. 5, pp. 1145-1150, November 1992; and Todd J. Cohen et al., Active **Compression - Decompression** : A New **Method** of Cardiopulmonary Resuscitation, The Journal of the American Medical Association, Vol. 267, No. 21, June 3, 1992.

The use of a **vacuum** -type cup for actively **compressing** and **decompressing** a patient's **chest** during ACD- **CPR** is described in a brochure of **AMBU** International A/S, Copenhagen, Denmark, entitled Directions for Use of AMBU(R) CardioPump(TM), published...

...connected a tubule that extends towards the opposite end of the tube and into a **valve** housing having an air inlet bore from which passages extend to the tubule and to an inflatable member. The bore contains **valve** means normally closing the adjacent ends of the passages, and means for opening the **valve** to admit air under pressure to those passages or to release it therefrom. The **valve** housing also has a bypass connecting the two passages and closed by a check **valve** preventing escape of air from the cuff to the inflatable member in case the outside...

...SUMMARY OF THE INVENTION

According to the invention, devices for increasing cardiopulmonary circulation induced by **chest compression** and **decompression** when performing cardiopulmonary resuscitation are provided. The devices may be used in connection with any generally accepted CPR **methods** or with active **compression - decompression** (ACD) CPR **techniques** . Preferably, the **methods** and devices will be used in connection with ACD-CPR.

Cardiopulmonary circulation is increased according to the invention by impeding airflow into a patient's **lungs** during the **decompression** phase. This increases the magnitude and prolongs the duration of negative **intrathoracic** pressure during **decompression** of the patient's **chest** , ie. increases the duration and degree that the **intrathoracic** pressure is below or negative with respect to the pressure in the peripheral venous vasculature. By enhancing the amount of venous blood flow into the heart and **lungs** , since equilibration of **intrathoracic** pressure during **decompression** occurs to a greater extent from enhanced **venous return** rather than rapid inflow of gases into the **chest** via the patient's airway, cardiopulmonary circulation is increased.

According to the present invention there is provided a **valving**

system for regulating airflow into a patient's **lungs** when performing cardiopulmohary resuscitation wherein the patient's **chest** is **compressed** and **decompressed** , the **system** comprising, a housing having an upstream region and a downstream region, characterised by means between...

...flow into the downstream region when ventilating the patient.
The inhibiting means may comprise a **valve** which allows airflow from the downstream region to the upstream region, the **valve** may include a diaphragm which is closed when the pressure in the downstream region is ...

...region to open the diaphragm and to allow air to flow to the patient's **lungs** .
Conveniently the means for allowing air into the downstream region comprises a manually operable **valve** at the downstream region which is manually opened to allow air to flow unimpeded into...

...patient.
The means for allowing air into the downstream region may comprise a pressure responsive **valve** at the downstream region for allowing air into the downstream region when the pressure in...

...level in the range from -5 cm H2))O to -60 cm H2))O.
The **system** may further comprise a respiratory member connected to the housing at the upstream region for...

...air exhaust opening at the upstream region for exhausting air from the housing, and a **valve** in the exhaust opening which inhibits air from flowing into the housing through the exhaust opening.
Such a **system** may further comprise means for preventing air from exiting the housing through the exhaust opening during injection of air from the respiratory bag, which means may be a fish mouth **valve** , and a connection member connected to the housing at the downstream region for connecting the...

...connection member may include an endotracheal tube, a facial mask, or a laryngeal mask.
A **valving system** according to the invention may further comprise a respirator connected to the housing at the...

...airway tube may include an endotracheal tube.
Apparatus for assisting cardiopulmonary resuscitation may comprise a **valving system** as defined above together with an endotracheal tube of the type having a tube suitable...

...whereby airflow is impeded to a fixed or variable degree from entering the patient's **lungs** to enhance the extent and duration of negative **intrathoracic** pressure during **decompression** of the patient's **chest** to enhance venous blood flow into the heart and **lungs** from the peripheral venous vasculature when performing cardiopulmonary resuscitation.
The means for inhibiting air flow...

...the endotracheal tube.
Alternatively, the means for inhibiting air flow may comprise a pressure-responsive **valve** within the first lumen of the tube, the **valve** being biased to open to permit the inflow of air when the **intrathoracic** pressure falls below a threshold level in the range from 0 cm H2))O to...

...bypassing air round the inflow impeding means.

Apparatus for assisting cardiopulmonary resuscitation may comprise a **valving system** as defined above together with a **compressible** structure having a first opening and a second opening, a one-way **valve** for the intake of air included in or attached to the first opening, and means...

...a preselected volume of air, means for interfacing in a permanent or detachable manner said **compressible** structure to the patient, and means included in or attached to the second opening of the **compressible** structure to impede the flow of gases to the patient's **lungs** until a minimum **intrathoracic** pressure is exceeded, whereby a rise in **intrathoracic** pressure is slowed during **decompression** of the patient's **chest** and the extent and duration of negative **intrathoracic** pressure is enhanced in order to enhance venous blood flow into the heart and **lungs** from the peripheral venous vasculature when performing cardiopulmonary resuscitation.

The inflow impeding means may further...

...orifice disposed within or connected in series in a permanent or detachable manner with the **compressible** structure.

Alternatively the inflow impeding means may comprise a pressure-responsive **valve** , the **valve** being biased to open to permit the inflow of air when the **intrathoracic** pressure falls below a threshold level in the range from 0 cm H2))O to...

...or a laryngeal mask.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a graph illustrating **thoracic** pressure changes over time when **compressing** and **decompressing** a patient's **chest** according to the present invention.

Fig. 2A is a schematic view illustrating airflow through a ventilation circuit when **compressing** a patient's **chest** according to the present invention.

Fig. 2B is a schematic view illustrating airflow through a ventilation circuit when **decompressing** a patient's **chest** according to the present invention.

Fig. 3 is a schematic illustration of a first alternative embodiment of a device for impeding airflow into a patient's **lungs** according to the present invention.

Fig. 4A is a schematic illustration of a second alternative embodiment of the device for impeding airflow into a patient's **lungs** according to the present invention.

Fig. 4B is a schematic illustration of the device in...

...a common inhalation/exhalation port.

Fig. 5A is a schematic view of a one-way **valve** used in the device for impeding airflow according to the present invention.

Fig. 5B is a schematic view of the one-way **valve** in Fig. 5A that is held open after ACD-CPR has ceased.

Fig. 5C is a schematic view of a one-way **valve** that is closed until a threshold pressure is present in the tube according to the present invention.

Fig. 6A is a schematic view of a spring biased inflow **valve** and a spring biased expiration **valve** to be used in accordance with the present invention.

Fig. 6B is a schematic view of Fig. 6A showing the operation of the **valves** during outflow of air.

Fig. 6C is a schematic view of Fig. 6A showing the operation of the **valves** during inflow of air.

Fig. 7 is a schematic view of a single **valve** that is spring biased from both sides to be used as an inflow **valve** and an expiration **valve** according to the present invention.

Fig. 8 is a schematic view of a flow restricting...

...view of an exemplary embodiment of the device for impeding airflow into a patient's **lungs** according to the present invention.

Figs. 10A-10C are schematic views illustrating another embodiment of the present invention allowing for periodic patient ventilation through a bypassing **valve** .

Fig. 11 is a schematic view of an exemplary **valving system** for regulating airflow into a patient's **lungs** according to the present invention. The **valving system** is shown with air being exhausted from a patient's **lungs** during **compression** of the patient's **chest** .

Fig. 12 illustrates the **valving system** of Fig. 11 during **decompression** or resting of the patient's **chest** .

Fig. 13 illustrates the **valving system** of Fig. 11 with a pressure-responsive **valve** being opened when the negative **intrathoracic** pressure in the patient's **chest** exceeds a threshold amount during **decompression** of the patient's **chest** .

Fig. 14 illustrates the **valving system** of Fig. 11 with a diaphragm being opened during injection of air into the housing when ventilating the patient.

Fig. 15 illustrates the **valving system** of Fig. 11 with a manually operable **valve** being opened to allow air into the patient's **lungs** upon return of spontaneous circulation.

Fig. 16A is a cutaway side view of exemplary **valving system** according to the present invention.

Fig. 16B is a top view of a deflector and a fenestrated mount of the **valving system** of Fig. 16A.

Fig. 16C is an alternative embodiment of the **valving system** of Fig. 16A.

Fig. 17 is a schematic view of an alternative embodiment of a **valving system** having a ball as a diaphragm.

DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS

According to the present invention, **methods** and devices for increasing cardiopulmonary circulation induced by **chest compression** and **decompression** when performing cardiopulmonary resuscitation are provided. Such **methods** and devices may be used in connection with any **method** of CPR in which **intrathoracic** pressures are intentionally **manipulated** to improve cardiopulmonary circulation. For instance, the present invention would improve standard manual CPR, "vest" CPR, CPR with a newly described Hiack Oscillator ventilatory **system** which operates essentially like an iron- **lung** -like device, interposed abdominal **compression - decompression** CPR, and active **compression - decompression** (ACD) CPR **techniques** . Although the present invention may improve all such **techniques** , the following description will refer primarily to improvements of ACD-CPR **techniques** in order to simplify discussion. However, the claimed devices are not exclusively limited to ACD-CPR **techniques** .

The proper performance of ACD-CPR to increase cardiopulmonary circulation is accomplished by actively **compressing** a patient's **chest** with anapplicator body. Preferably, this applicator body will be a **suction** -type device that will adhere to the patient's **chest** , such as the AMBU(R) CardioPump(TM), available from AMBU International, Copenhagen, Denmark. After the **compression** step, the adherence of the applicator body to the patient's **chest** allows the patient's **chest** to

be lifted to actively **decompress** the patient's **chest** . The result of such active **compression - decompression** is to increase **intrathoracic** pressure during the **compression** step, and to increase the negative **intrathoracic** pressure during the **decompression** step thus enhancing the blood-oxygenation **process** and enhancing cardiopulmonary circulation. ACD-CPR **techniques** are described in detail in Todd J. Cohen et al., Active **Compression - Decompression** Resuscitation: A Novel **Method** of Cardiopulmonary Resuscitation, American Heart Journal, Vol. 124, No. 5, pp. 1145-1150, November 1992; Todd J. Cohen et al., Active **Compression - Decompression** : A New **Method** of Cardiopulmonary Resuscitation, The Journal of the American Medical Association, Vol. 267, No. 21, June...

...89:684-693, 1994.

The present invention is especially useful in connection with ACD-CPR **techniques** . In particular, the invention improves ACD-CPR by providing **methods** and devices which impede airflow into a patient's **lungs** to enhance negative **intrathoracic** pressure during the **decompression** of the patient's **chest** , thus increasing the degree and duration of a pressure differential between the **thorax** (including the heart and **lungs**) and the peripheral venous vasculature. Enhancing negative **intrathoracic** pressure with simultaneous impedance of movement of gases into the airway thus enhances venous blood flow into the heart and **lungs** and increases cardiopulmonary circulation.

In a broad sense, the present invention provides for occluding a patient's airway to prevent foreign (outside) air from flowing to a patient's **lungs** during the active **decompression** step of ACD-CPR to enhance and sustain the duration of negative **intrathoracic** pressure and enhance blood oxygenation and cardiopulmonary circulation during both active **decompression** and the subsequent **compression** phase. The patient's airway may be occluded or inflow of gases impeded by any...

...of the present invention provides for allowing impeded air to flow into the patient's **lungs** during the active **decompression** step of ACD-CPR in order to provide some ventilation to the patient while still enhancing the extent and duration of negative **intrathoracic** pressure to enhance blood oxygenation. Impeding airflow to the patient's **lungs** may be accomplished by any flow restrictive element such as an orifice, a one-way **valve** , a spring biased or other **valve** which is set to open when the negative **intrathoracic** pressure is in the range from about 0 cm H2))O to -100 cm H2))O, or the like. A **valve** designed to open at a threshold pressure value may be either fixed or variable, i.e., the pressure at which the **valve** opens may be adjusted or may be permanently fixed.

Similarly, another aspect of the invention provides for air to be impeded from leaving the patient's **lungs** during **compression** of the patient's **chest** to further enhance cardiopulmonary circulation by enhancing **intrathoracic** pressure during the **compression** phase. Typically, air is impeded from leaving the **lungs** during the **compression** phase when the positive **intrathoracic** pressure is in the range from about 2 cm H2))O to 50 cm H2...

...during ACD-CPR. Ventilation of the patient is performed at about every two to 10 **compressions** , preferably every five **compressions** , thus providing sufficient fresh air for adequate gas exchange with the blood in the **lungs** to the patient. Ventilating the patient may be accomplished by any device or **method** suitable such as by mouth-to-mouth resuscitation, by a **compressible** or collapsible structure, by a ventilatory bag such as the AMBU bag available from AMBU, Copenhagen, Denmark, or the like. Ventilation could also be superimposed on the

compression phase to further augment positive **intrathoracic** pressure. Furthermore, periodic ventilation could be performed either through the impeding step or by bypassing the impeding step altogether.

Referring now to Fig. 1, a graph illustrating **thoracic** pressure changes over time when **compressing** and **decompressing** the patient's **chest** is shown. Area 10 represents the amount of **thoracic** pressure during the **compression** phase of ACD-CPR. Cross-hatched area 12 represents the negative **thoracic** pressure during the **decompression** step of ACD-CPR without a flow restrictive means to restrict the flow of air into the patient's **lungs** . Double cross-hatched area 14 represents the increase in negative **thoracic** pressure when the patient's airway is occluded according to the present invention during the **decompression** step of ACD-CPR. The significance of the increase in negative **intrathoracic** pressure during the **decompression** step is that more venous blood is forced into the **chest** from the peripheral venous vasculature. Consequently, more blood is allowed to be oxygenated and more blood is forced out of the **chest** during the next **compression** .

In an exemplary embodiment, airflow may be impeded to the patient's **lungs** during **decompression** of the patient's **chest** by placing a ventilatory mask over the patient's mouth and nose. The ventilatory mask also has a pressure-responsive **valve** attached to prevent airflow to the patient's **lungs** until the negative **intrathoracic** pressure of the patient reaches a threshold amount. Also attached to the mask and the pressure-responsive **valve** is a ventilatory source to provide ventilation to the patient. The ventilatory source may be...

...is needed, the AMBU bag may be squeezed to force air into the patient's **lungs** . The AMBU bag is described in U. ...an AMBU bag, is used in connection with an improved endotracheal tube. A pressure-responsive **valve** or other flow restrictive element is placed between the AMBU bag and the endotracheal tube. Preferably, the **valve** will be positioned within a tube that connects the AMBU bag to the endotracheal tube...

...performed on the patient, the endotracheal tube is placed in the patient's trachea. During **decompression** of the patient's **chest** , the **valve** prevents airflow to the patient's **lungs** until the **intrathoracic** pressure reaches a threshold amount. Additionally, the AMBU bag may be used to ventilate the patient at a desired time. Also included in this embodiment is a one-way expiration **valve** . This **valve** allows for expiration of air from the patient during the **compression** step.

In a modification of either of the first two embodiments, a pressure-responsive expiration **valve** may also be inserted between the AMBU bag (or comparable ventilation source) and the mask or endotracheal tube. This **valve** works in a similar manner to the pressure-responsive **valve** which restricts airflow into the patient's **lungs** . However, the pressure-responsive expiration **valve** restricts airflow from the patient's **lungs** during the **compression** step of ACD-CPR. An equivalent **valve** is a **positive end0 - expiratory pressure (PEEP) valve** available from **AMBU** International, Copenhagen, Denmark. Use of such a pressure-responsive expiration **valve** during **compression** may further increase **intrathoracic** pressure and thereby force more blood out of the **thorax** .

In another alternative embodiment, an improved endotracheal tube is used to restrict airflow into the patient's **lungs** during the active **decompression** step. Included in the endotracheal tube is a flow restrictive element which operates to impede air from flowing into the patient's **lungs** . When the endotracheal tube is inserted into the patient's trachea and the patient's **chest** is actively **decompressed** , the flow restrictive element impedes air from flowing to the patient's

lungs slowing the rise in **intrathoracic** pressure and thus enhancing blood oxygenation.

When using the improved endotracheal tube during ACD-CPR...

...the endotracheal tube to force oxygen through the endotracheal tube and into the patient's **lungs** .

Referring now to Fig. 2A, a schematic view illustrating airflow through a ventilation circuit 20 when **compressing** a patient's **chest** according to the present invention is shown. During ACD-CPR, the **chest** is actively **compressed** forcing air out of the **lungs** . This air is allowed to expire through a one-way expiration **valve** 22 within a ventilation circuit 20.

Referring now to Fig. 2B, the same schematic is shown illustrating airflow through the ventilation circuit 20 when **decompressing** the patient's **chest** . When the patient's **chest** is actively **decompressed** , a negative **intrathoracic** pressure is created. When this pressure reaches a threshold amount, the inflow **valve** 24 will open causing air to flow through the ventilation circuit 20 into the patient's **lungs** . Air is allowed into the ventilation circuit 20 through a ventilation **valve** 26 and into a ventilation bag 28. From the ventilation bag 28, the air passes through the inflow **valve** 24 when the negative **intrathoracic** pressure reaches the threshold amount. The ventilation bag 28 is also used to manually ventilate the patient during ACD-CPR as required.

The **method** as discussed in connection with Figs. 2A and 2B requires the **chest** to be **compressed** in the range from about 3.5 cm to 5 cm per **compression** and at a rate from about 60 to 100 **compressions** per minute for adults.

Referring now to Fig. 3, a schematic illustration of a first alternative embodiment of a device 35 for impeding airflow into a patient's **lungs** according to the present invention is shown. The device 35 comprises an endotracheal tube 36...

...can comprise any type of ventilation source capable of ventilating the patient such as a **compressible** or collapsible structure. Preferably, the ventilation bag 28 consists of an AMBU bag. Attached or connected to the end of the ventilation bag 28 is a one-way ventilation **valve** 26. The ventilation **valve** 26 serves to introduce air into the device 35. Attached or connected to the transition tube 38 is an inflow pressure-responsive **valve** 24. The inflow **valve** 24 is biased so that it opens when the negative **intrathoracic** pressure in the patient's **chest** reaches a threshold amount. As shown, only one inflow **valve** 24 is included in the device 35. However, the invention is not limited to only one inflow **valve** 24. Alternatively, a plurality of inflow **valves** 24 could be connected in series along the ventilation tube 38. The inflow **valve** 24 is also not limited to being connected in the center of the transition tube 38, but may be positioned anywhere along the transition tube 38. The inflow **valve** 24 could be permanently attached to the ventilation bag 28 or transition tube 38 or could be detachable. Alternatively, the inflow **valve** 24 could be connected to the ventilation bag 28 itself or to the endotracheal tube 36.

The device 35 also contains a one-way expiration **valve** 22 which allows for air to be expired from the patient's **lungs** . This generally occurs during the **compression** phase of ACD-CPR. To insure that the air expired from the patient's **lungs** will exit through the expiration **valve** 22, a one-way fish mouth **valve** 37 (the preferred valve) or any other type of one-way **valve** can be placed between the inflow **valve** 24 and the expiration **valve** 22. Alternatively, the inflow **valve** 24 itself may be configured as a one-way **valve** . In either case, air flowing from the endotracheal tube 36 toward the ventilation bag 28 will be forced to expire through the expiration **valve** 22.

The device 35 may be further modified to include a pressure-responsive expiration **valve** (not shown) located between the endotracheal tube 36 and the transition tube 38. The pressure-responsive expiration **valve** works in a reverse manner to that of the inflow **valve** 24. Specifically, the pressure-responsive expiration **valve** is biased so that during the **compression** step of ACD-CPR, air will be allowed to expire from the patient's **lungs** only when the **intrathoracic** pressure reaches a threshold amount. The increase in **intrathoracic** pressure caused by the pressure-responsive expiration **valve** during **compression** may assist in forcing more blood out of the **thorax** and reduce atelectasis of the **lungs** .

The purpose of the ventilation **bag** 28 is to provide ventilation to the patient during ACD- **CPR** . When the ventilation **bag** 28 comprises an **AMBU bag** or similar bag used for ventilation, ventilation of the patient may be performed by merely squeezing the AMBU bag with a human hand. This forces air to the patient's **lungs** as desired.

Referring to Fig. 4A, a second alternative embodiment of the device for impeding airflow into a patient's **lungs** according to the present invention is shown. This particular embodiment is a modified and improved ...

...inflow lumen 42. Located within outflow lumen 40 is a one-way pressure-responsive expiration **valve** 44 which operates in a manner similar to that discussed in connection with Fig. 3, except that the expiration **valve** 44 is specifically designed as a one-way **valve** . Located within inflow lumen 42 is a one-way pressure-responsive inflow **valve** 45 which operates to impede airflow to the **lungs** as discussed in connection with Fig. 3, except that the inflow **valve** 45 is also specifically designed as a one-way **valve** . Also shown in inflow lumen 42 and outflow lumen 40 is an O-ring 46 which will be discussed subsequently. Inflow **valve** 45 and expiration **valve** 44 are designed as one-way **valves** so that during the **compression** phase, air can only be expired from the patient through the endotracheal tube 36 when the **intrathoracic** pressure reaches a threshold amount. At that moment, expiration **valve** 44 opens and air expires from the patient through the outflow lumen 40. During **decompression** , air cannot flow through the endotracheal tube 36 to the patient's **lungs** until the negative **intrathoracic** pressure reaches a threshold amount. At that moment, inflow **valve** 45 opens allowing air to flow through inflow lumen 42 to the patient's **lungs** . Air is prevented from entering through the outflow lumen 40 because of the one-way expiration **valve** 44.

Ventilation is possible with the embodiment disclosed in Figs. 4A and 4B if the...

...through the inflow lumen 42, through the endotracheal tube 36, and to the patient's **lungs** . In this embodiment, expiration **valve** 44 is designed so that during ventilation, expiration **valve** 44 will remain temporarily closed preventing air flowing through inflow lumen 42 escape through outflow lumen 40.

Fig. 5A is a schematic view of a one-way inflow **valve** 45 used in a device for impeding airflow according to the present invention. The inflow **valve** 45 operates so as to allow air only to flow in one direction. As shown, the spring biased inflow **valve** 45 is completely open. However, the invention also functions properly if the spring biased inflow **valve** 45 or the spring biased expiration **valve** 44 are not fully open. Upon successful completion of ACD-CPR, the O-ring 46 that is positioned above the inflow **valve** 45 is repositioned so that inflow **valve** 45 is held open as shown in Fig. 5B. Such a positioning of O-ring ...

...airflow to the patient once there is a return of spontaneous circulation and the inflow **valve** 45 is no longer needed. An O-ring 46 is also used in a similar manner to lock the one-way expiration **valve** 44 in an open position upon return of spontaneous circulation. Fig. 5C illustrates the one-way inflow **valve** 45 in a closed position. When closed, the inflow of air through the inflow **valve** 45 is occluded.

Fig. 6A illustrates an inflow **valve** 47 that is spring biased and an expiration **valve** 48 that is also spring biased. The inflow **valve** 47 and the expiration **valve** 48 are connected in series and may be used in the first alternative embodiment as...

...discussed following in connection with Fig. 9. As shown in Fig. 6C, during the active **decompression** step, the inflow **valve** 47 is biased such that it will open when the negative **intrathoracic** pressure reaches a threshold amount. During the **compression** phase of ACD-GPR the expiration **valve** 48 will open to allow air to expire from the patient's **lungs** when the **intrathoracic** pressure within the patient's **chest** reaches a threshold amount as shown in Fig. 6B. Since neither inflow **valve** 47 nor expiration **valve** 48 are one-way **valves** , a fish mouth **valve** 37 used in connection with a one-way expiration **valve** 22 as discussed in connection with Fig. 3 must be used. Other **valves** designed upon a similar principle as the fish mouth **valve** combination with a one-way expiration **valve**0 could also be used. Only one inflow **valve** 24 and one positive end pressure **valve** 44 are shown in Figs. 6A-6C. However, a plurality of inflow **valves** 47 and/or expiration **valves** 48 may be connected in a permanent or detachable manner in series to impede the inflow and outflow of air.

Although the **valves** in Figs. 6A-6C are shown as being spring-biased, any other **valves** designed upon a similar principle would work equally as well. The use of such **valves** as disclosed in Figs. 6A-6C is only one embodiment and **valves** constructed according to various other **methods** and materials is also within the scope of the invention.

As shown inFig. 7, the inflow **valve** 47 and the expiration **valve** 48 may be combined into one joint **valve** 49 as shown. The joint **valve** 49 will operate in a manner similar to the two **valves** 47 and 48 as described in connection with Fig. 6.

Fig. 8 illustrates a flow...

...to be used to either impede the airflow into or out of a patient's **lungs** . The flow restricting orifice 50 operates so that during the **decompression** step of ACD-CPR airflow is impeded from entering into the patient's **lungs** , thus increasing the negative **intrathoracic** pressure. During the **compression** step, the flow restricting orifice 50 operates to increase the **thoracic** pressure in the patient's **chest** by restricting air from existing from the patient's **lungs** .

Fig. 9 illustrates an exemplary embodiment for impeding airflow into a patient's **lungs** according to the present invention. As shown, the device 51 comprises a ventilation bag 28 that is connected to a facial mask 52 by an inflow **valve** 24 and an expiration **valve** 22. Although the facial mask 52 is shown connected to the ventilation bag 28, the...

...52 can be used alone or in connection with the ventilation bag. Between the inflow **valve** 24 and the expiration **valve** 22 is a one-way fish mouth **valve** 37 or any other type of one-way **valve** to prevent air from exiting the patient's **lungs** and flowing to the ventilation bag 28. The ventilation bag 28 also contains a one-way ventilation **valve** 26 for allowing air to inflow into the device 51. The exemplary embodiment operates in...

...plastic material and may or may not be attached to the device 51.

During the **decompression** phase of ACD-CPR, air is prevented from entering into the patient's **lungs** through the threshold inflow **valve** 24 thus increasing the negative **intrathoracic** pressure. During the **compression** phase, air is allowed to expire from the patient's **lungs** through the expiration **valve** 22. Also, the patient can be ventilated during ACD- **CPR** by manually squeezing the ventilation **bag** 28. Consequently, the preferred embodiment serves to enhance **cardiopulmonary circulation** by increasing the negative **intrathoracic** pressure to force more blood into the **chest** from the peripheral venous vasculature.

Figs. 10A - 10C show another embodiment of the present invention...

...that is connected to the patient. The ventilation tube 60 has a one-way bypass **valve** 66 and a one-way pressure responsive **valve** 68. The ventilation tube 60 may also have a manual switch 70 attached to the bypass **valve** 66 and extending through a side of the ventilation tube 60. As shown in Fig...

...70 may be set in a closed position so that the one-way pressure responsive **valve** 68 opens when the threshold pressure of the **valve** 68 has been exceeded. At this point, the **valve** 68 opens allowing for ventilation of the patient. As shown in Fig. 10B, the one-way pressure responsive **valve** 68 may be bypassed altogether by manually placing the switch 70 in the open position so that the bypass **valve** 66 is opened allowing air to flow to the patient. Fig. 10C illustrates the operation of the bypass **valve** 66 with the switch 70 in an inactive mode. Here, the rescuer performing ventilation may do so without added resistance from the impedance step as in Fig. 10A. Instead, bypass **valve** 66 opens only when the pressure at the proximal end of the tube 62 is...

...pressure (0 nmHg), preferably in a range from about 0 mmHg to 5 mmHg. During **decompression** of the patient's **chest** , the one-way bypass **valve** 66 remains closed unless atmospheric pressure is exceeded. Thus, the patient is ventilated only when...

...of the tube 62 to exceed atmospheric pressure. The function of the one-way bypass **valve** 66 may be performed by many different threshold **valve** designs which are known in the art.

In another aspect of the invention, an exemplary **valving system** is provided for enhancing the duration and extent of negative **intrathoracic** pressure during the **decompression** phase of CPR while still providing adequate ventilation to the patient. The **valving system** is employed to slow the rapid equilibrium of **intrathoracic** pressure in the **chest** during **decompression** by impeding or inhibiting the flow of air into the patient's **chest** . Lowering of the **intrathoracic** pressure in this manner provides a greater coronary perfusion pressure and hence forces more venous blood into the **thorax** . The **valving system** can be employed in a variety of CPR **methods** where **intrathoracic** pressures are intentionally **manipulated** to improve cardiopulmonary circulation, including "vest" CPR, CPR incorporating a Heimlich ventilatory **system** , intraposed abdominal **compression - decompression** CPR, standard manual CPR, and the like, and will find its greatest use with ACD-CPR.

Referring to Figs. 11-15, an exemplary embodiment of a **valving system** 100 is shown schematically. The **valving system** 100 includes a housing 101 having an upstream region 102 and a downstream region 104...

...greater than atmospheric, is developed in the upstream region 102 when

ventilating the patient. The **valving system** 100 further includes a **valve** 108 having a plug 110. As described in greater detail hereinafter, the **valve** 108 is included to provide ventilation to the patient when opened. The **valve** 108 can be manually opened by axial translation or it can be automatically opened when...

...air is exhausted from the housing 101 through the air exhaust opening 114. An accordion **valve** 116, fishmouth **valve** , or the like is provided between the air intake opening 112 and the air exhaust opening 114. As described in greater detail hereinafter, the accordion **valve** 116 is used to prevent air that is injected into the air intake opening 112...

...provided in the downstream region 104 for preventing excess body fluids from entering into the **system** 100.

Operation of the **valving system** 100 during **compression** of a patient's **chest** is illustrated in Fig. 11. As the patient's **chest** is **compressed** , air is forced from the patient's **lungs** and into the downstream region 104. The air forced into the downstream region 104 is ...

...preferably at about 2 cm H2))O to 4 cm H2))O.

Operation of the **valving system** 100 during **decompression** (or resting) of the patient's **chest** is illustrated in Fig. 12. As the patient's **chest** is actively lifted (or allowed to expand on its own), air is drawn from the downstream region 104 and into the patient's **lungs** , thereby reducing the pressure in the downstream region 104. The resulting pressure differential between the...

...downstream region 104. In this way, air is inhibited from flowing into the patient's **lungs** during **decompression** of the patient's **chest** , thereby lowering the **intrathoracic** pressure to increase the coronary perfusion pressure and to force more venous blood into the **thorax** .

Various ways of providing ventilation to the patient using the **valving system** 100 are described in Figs. 13-15. Fig. 13 illustrates airflow into the downstream region 104 and to the patient's **lungs** during **decompression** of the patient's **chest** after a threshold amount of negative **intrathoracic** pressure has been reached. Ventilation in this manner is advantageous in that the **valving system** 100 can be employed to produce at least a threshold amount of **intrathoracic** pressure to enhance blood flow into the heart and **lungs** . Once such a pressure is reached, some air is allowed to flow to the patient's **lungs** to ventilate the patient.

Air is allowed to enter the downstream region 104 when the threshold amount of **intrathoracic** pressure is reached by configuring the **valve** 108 to be a threshold **valve** . The **valve** 108 can be configured in a variety of ways, with a primary function being that the **valve** 108 allows air to flow into the downstream region 104 when a threshold amount of **intrathoracic** pressure is reached. This is preferably accomplished by configuring the plug 110 to be flexible...

...lower pressure upstream region 102 into the downstream region 104 and to the patient's **lungs** . The plug 110 therefore acts as a one-way **valve** allowing air to flow from the upstream region 102 into the downstream region 104 when...40 cm H2))O, and more preferably at about 30 cm H2))O. Alternatively, the **valve** 108 can be placed in the downstream region 104 so that air flows into the downstream region 104 directly from the atmosphere when the **valve** 108 is open.

Ventilating the patient by injecting air into the upstream region 102 is...

...14. As air is injected through the intake opening 112, it passes into the accordion **valve** 116 and forces the **valve** 116 against a wall 120 and covers a hole 122 in the wall 120 to prevent airflow through the exhaust opening 114. When the accordion **valve** 116 is closed, air flows through a wall 124 of the **valve** 116 and into the upstream region 102. Alternatively, a fishmouth **valve** can be used in place of the accordion **valve** 116. Upon injection of the air into the upstream region 102, the pressure within the...

...created allowing air to flow into the downstream region 104 and into the patient's **lungs** . Preferably, the patient will be manually ventilated by injecting air into the intake opening 112 about every three to seven **compressions** of the **chest** , and more preferably about every five **compressions** of the **chest** .

Configuration of the **valving system** 100 upon return of spontaneous circulation is illustrated in Fig. 15. When the patient's circulation is restored, the **valve** 108 is manually opened by translating the **valve** 108 to remove the plug 110 from aperture 126. The upstream region 102 and downstream...

...each of the regions 102, 104. Although shown extending through the upstream region 102, the **valve** 108 can alternatively be placed anywhere along the downstream region 104.

The **valve** 108 can be configured as a pressure-responsive **valve** (see Fig. 13), as a manually operable **valve** (see Fig. 15), or both. Further, the **valving system** 100 can alternatively be provided with two or more **valves** that are similar to the **valve** 108. For example, one **valve** could be non-translatably held in the housing 101 and provided with a pressure-responsive plug 110, with the other **valve** being translatably mounted. In this manner, the **valve** with the flexible plug functions as a pressure-responsive **valve** and opens when the threshold pressure is reached, while the translatable **valve** functions to place the regions 102, 104 in communication upon manual operation after spontaneous circulation is achieved.

Referring to Figs. 16A and 16B, an exemplary embodiment of a **valving system** 130 will be described. The **valving system** 130 is constructed of a housing 132 having an intake opening 134, an exhaust opening...

...and a delivery opening 138. Included in the exhaust opening 136 is a one-way **valve** which allows air to flow from the housing 132 and out the exhaust opening 136. An accordion **valve** 140 is provided between the intake opening 134 and an exhaust opening 136 to prevent...

...AMBU bag), a ventilator, a mouthpiece or port for mouth-to-mouth breathing through the **system** 130, or the like. The delivery opening 138 is preferably configured for connection to an...

...downstream region 144, with the diaphragm 148 resting on the cylinder during ambient conditions. During **decompression** of the patient's **chest** , the reduction in pressure in the downstream region 144 draws the diaphragm 148 against the...

...to prevent exchange of air between the upstream region 142 and downstream region 144. During **compression** of the patient's **chest** , air is forced into the downstream region 144 to force the diaphragm 148 into the ambient pressure region 146 so that the air exhausted from the patient's **chest** can be exhausted through the exhaust opening 136.

As shown best in Fig. 16B, the **valving system** 130 is further provided with a fenestrated mount 150. In one aspect, the fenestrated

mount...

...a filter 159 can be provided to prevent excess body fluids from entering into the **system** 130.

The **valving system** 130 further includes a threshold **valve** 160 at the downstream region 144. When the pressure within the downstream region 144 is less than the threshold amount, the threshold **valve** 160 is opened to allow air to flow into the downstream region 144. The threshold **valve** 160 includes a spring 162 which is configured to extend when the threshold amount is reached. Alternatively, the threshold **valve** 160 can be configured similar to the **valve** 110. Other configurations which allow the air to enter the downstream region 144 when the desired **intrathoracic** pressure is reached or exceeded can also be provided. For example, in a further alternative, the diaphragm 148 can be constructed to function as a threshold **valve** to allow air to flow into the patient's **lungs** when a threshold amount of **intrathoracic** pressure is reached. The diaphragm 148 can be fashioned as a threshold **valve** by constructing the diaphragm 148 of an elastomeric material and by providing at least one...

...positioned beyond the periphery of the cylinder and in the upstream region 142. As a **vacuum** is created in the downstream region 144, the diaphragm is drawn into the downstream region...

...the threshold pressure is reached in the downstream region 144. Another alternative of a threshold **valve** 111 is illustrated in Fig. 16C. The **valve** 111 is pivot mounted within the downstream region 144 and is biased closed by a...

...When the threshold pressure within the downstream region 144 is reached, the spring 113 is **compressed** and air is drawn into the downstream region 144.

Referring back to Fig. 16A, the threshold **valve** 160 can optionally be provided within the housing 132 at the upstream region 142. The threshold **valve** 160 can further optionally be provided with an on/off switch for opening the **valve** 160 when spontaneous circulation is achieved. In this manner, a rescuer can open the **valve** 160 to allow for free exchange of air to the patient's **lungs** when needed. In one alternative as shown in Fig. 16C, the mount 150 can be...

...or close the diaphragm 148. If the diaphragm 148 were also fashioned as a threshold **valve** as previously described, the need for the **valves** 108 or 111 could be eliminated.

The housing 132 can conveniently be constructed in several...

...158 for removably connecting the portion of the housing having the intake opening 134, the **valve** 140, and the exhaust opening 136. Alternatively, a connection point can be provided near the mount 150 to provide easy access to the mount 150 for cleaning.

The **valving system** 130 can conveniently be incorporated with a variety of devices useful in CPR **procedures** . For example, the **valving system** 130 can be incorporated within a respiratory bag, such as an AMBU bag. Alternatively, the **valving system** 130 can be included as part of a respiratory circuit having both a respiratory bag and an endotracheal tube or other airway tube, with the **valving system** 130 positioned between the bag and the tube. In a further alternative, the **valving system** 130 can be added to an endotracheal tube alone. Alternatively, the **valving system** can be incorporated into a mask, an oralpharyngeal airway, a laryngeal mask or other ventilatory devices.

Referring to Fig. 17, an alternative **valving system** 164 will be

described. The **valving system** 164 is shown schematically and operates essentially identically to the **valving system** 100, the difference being that the **valving system** 164 includes a ball or spherical member 166 as the diaphragm. During **decompression** of the patient's **chest**, the pressure in a downstream region 168 is less than the pressure in an upstream region 170 which draws the ball 166 over the downstream region 168. The **valving system** 164 can optionally be provided with a spring or other biasing mechanism to hold the ball 166 over the downstream region 168 during **compression** of the patient's **chest** until a threshold pressure is reached or exceeded in the downstream region 168 as previously...

...CLAIMS B1

1. A **valving system** (100) for regulating airflow into a patient's **lungs** when performing cardiopulmonary resuscitation wherein the patient's **chest** is **compressed** and **decompressed**, the **system** comprising:

a housing (101) having an upstream region (102) and a downstream region (104), characterised...

...allowing air to flow into the downstream region (104) when ventilating the patient.

2. The **system** of claim 1, wherein the inhibiting means comprises a **valve** which allows airflow from the downstream region (104) to the upstream region (102), wherein the **valve** includes a diaphragm (106) which is closed when the pressure in the downstream region (104) is less than or equal to the pressure in the upstream region (102).

3. The **system** of claim 2, wherein the diaphragm is a flexible membrane (106) or a ball (166...

...118) to open the diaphragm and to allow air to flow to the patient's **lungs**.

4. The **system** of claim 3, wherein the means for allowing air into the downstream region (104) comprises a manually operable **valve** (108) at the downstream region (104) which is manually opened to allow air to flow...

...into the downstream region (104) upon return of spontaneous breathing by the patient.

5. The **system** of claim 1, wherein the means for allowing air into the downstream region (104) comprises a pressure responsive **valve** (110) at the downstream region (104) for allowing air into the downstream region (104) when...

...in the range from -5 cm H2))O to -60 cm H2))O.

6. The **system** of claim 1, further comprising a respiratory member connected to the housing at the upstream...

...the upstream region (102) for exhausting air from the housing (101), and further comprising a **valve** (44) in the exhaust opening which inhibits air from flowing into the housing (101) through the exhaust opening (114).

7. The **system** of claim 6, further comprising means (116) for preventing air from exiting the housing (101...

...28), wherein the means for preventing air from exiting the housing is a fish mouth **valve**, and further comprising a connection member connected to the housing at the downstream region for...

...includes an endotracheal tube (36), a facial mask (52), or a laryngeal mask.

8. A **valving system** as claimed in claim 1 and further comprising:
a respirator (28) connected to the housing...

...101) at the downstream region (104) for insertion into the patient's airway.

9. The **system** of claim 8, wherein the respirator includes a respiratory bag (28) or a ventilation port...

...airway tube includes an endotracheal tube (36).

10. Apparatus for assisting cardiopulmonary resuscitation comprising a **valving system** as claimed in claim 1 together with an endotracheal tube (36) of the type having...

...whereby airflow is impeded to a fixed or variable degree from entering the patient's **lungs** to enhance the extent and duration of negative **intrathoracic** pressure during **decompression** of the patient's **chest** to enhance venous blood flow into the heart and **lungs** from the peripheral venous vasculature when performing cardiopulmonary resuscitation.

11. The apparatus of claim 10...

...apparatus of claim 10 wherein the means for inhibiting air flow comprises a pressure-responsive **valve** (110) within the first lumen of the tube (36), wherein the **valve** (110) is biased to open to permit the inflow of air when the **intrathoracic** pressure falls below a threshold level in the range from 0 cm H2))O to...

...bypassing air round the inflow impeding means.

13. Apparatus for assisting cardiopulmonary resuscitation comprising a **valving system** as claimed in claim 1 together with a **compressible** structure (28) having a first opening and a second opening, a one-way **valve** (26) for the intake of air included in or attached to the first ...volume of air;

means (36,52) for interfacing in a permanent or detachable manner said **compressible** structure to the patient; and

means (22) included in or attached to the second opening of the **compressible** structure to impede the flow of gases to the patient's **lungs** until a minimum **intrathoracic** pressure is exceeded, whereby a rise in **intrathoracic** pressure is slowed during **decompression** of the patient's **chest** and the extent and duration of negative **intrathoracic** pressure is enhanced in order to enhance venous blood flow into the heart and **lungs** from the peripheral venous vasculature when performing cardiopulmonary resuscitation.

14. The apparatus of claim 13...

...50) disposed within or connected in series in a permanent or detachable manner with the 1compressible structure.

15. The apparatus of claim 13, wherein the inflow impeding means comprises a pressure-responsive **valve** (110), wherein the **valve** (110) is biased to open to permit the inflow of air when the **intrathoracic** pressure falls below a threshold level in the range from 0 cm H2))O to...

...CLAIMS B1

24/3,K/7 **(Item 7 from file: 348)**
DIALOG(R)File 348:EUROPEAN PATENTS

00703210
DEVICE FOR ASSISTING CARDIOPULMONARY RESUSCITATION
VORRICHTUNG ZUR UNTERSTUTZUNG BEI KARDIOPULMONALER WIEDERBELEBUNG
DISPOSITIF D'ASSISTANCE A LA REANIMATION CARDIO- PULMONAIRE
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CLAIMS B	(German)	200321	274
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SPEC B	(English)	200321	5414
Total word count - document A			0
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Total word count - documents A + B			6220

DISPOSITIF D'ASSISTANCE A LA REANIMATION CARDIO- PULMONAIRE
INTERNATIONAL PATENT CLASS: **A61M-015/00** ...

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LEGAL STATUS (Type, Pub Date, Kind, Text):
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Grant...

...SPECIFICATION B1
The present invention relates generally to devices used in conjunction with external **chest compression** and **decompression** as a part of

cardiopulmonary resuscitation **procedures** . In particular, the present invention relates to devices for increasing cardiopulmonary circulation induced by **chest compression** and **decompression** when performing cardiopulmonary resuscitation.

Worldwide, sudden **cardiac arrest** is a major cause of death and is the result of a variety of circumstances, including heart disease and significant trauma. In the event of a **cardiac arrest** , several measures have been deemed to be essential in order to improve a patient's ...

...possible to at least partially restore the patient's respiration and blood circulation. One common **technique** , developed approximately 30 years ago, is an external **chest compression technique** generally referred to as cardiopulmonary resuscitation (CPR). CPR **techniques** have remained largely unchanged over the past two decades.

With traditional CPR, pressure is applied to a patient's **chest** in order to increase **intrathoracic** pressure.

An increase in **intrathoracic** pressure induces blood movement from the region of the heart and **lungs** towards the peripheral arteries. Such pressure partially restores the patient's circulation. Traditional CPR is performed by actively **compressing** the **chest** by direct application of an external pressure to the **chest** . After active **compression** , the **chest** is allowed to expand by its natural elasticity which causes expansion of the patient's **chest** wall. This expansion allows some blood to enter the cardiac chambers of the heart. The **procedure** as described, however, is insufficient to ventilate the patient. Consequently, conventional CPR also requires periodic ventilation of the patient. This is commonly accomplished by mouth-to-mouth **technique** or by using positive-pressure devices, such as a self-inflating bag which relies on ...

...mask, endotracheal tube or other artificial airway.

In order to increase cardiopulmonary circulation induced by **chest compression** , a **technique** referred to as active **compression - decompression** (ACD) has been developed. According to ACD **techniques** , the active **compression** phase of traditional CPR is enhanced by pressing an applicator body against the patient's **chest** to **compress** the **chest** . Such an applicator body is able to distribute and apply force substantially evenly over a portion of the patient's **chest** . More importantly, however, the applicator body is sealed against the patient's **chest** so that it may be lifted to actively expand the patient's **chest** during the **decompression** step. The resultant negative **intrathoracic** pressure induces venous blood to flow into the heart and **lungs** from the peripheral venous vasculature of the patient.

Also of importance to the invention are ventilation sources that are used in connection with CPR **techniques** to properly ventilate the patient. One type of ventilation source is the AMBU bag available from AMBU International, Copenhagen, Denmark. The **AMBU bag** can also be used in connection with a **positive end - expiratory pressure** (**PEEP**) **valve** , available from **AMBU** International, to treat some patients with **pulmonary** and cardiac diseases. However, until the present invention, a positive end-expiratory pressure **valve** in connection with a ventilation source has not been used with any CPR **techniques** .

With both traditional CPR and ACD-CPR **techniques** , an increase in the amount of venous blood flowing into the heart and **lungs** from the peripheral venous vasculature would be desirable to increase the volume of oxygenated blood leaving the **thorax** during the subsequent **compression** phase. It would therefore be desirable to provide improved apparatus for enhancing venous blood flow into the heart and **lungs** of a

patient from the peripheral venous vasculature during both conventional CPR and ACD-CPR **techniques** . It would be particularly desirable to provide apparatus which would enhance oxygenation and increase the total blood return to the **chest** during the **decompression** step of CPR and ACD-CPR, more particularly of ACD-CPR. This can be accomplished according to the present invention by augmentation of both negative and positive **intrathoracic** pressure, thereby amplifying the total **intrathoracic** pressure swing. An invention for providing this crucial improvement is described.

ACD-CPR **techniques** are described in detail in Todd J. Cohen et al., Active **Compression - Decompression** Resuscitation: A Novel **Method** of Cardiopulmonary Resuscitation, American Heart Journal, Vol. 124, No. 5, pp. 1145-1150, November 1992; Todd J. Cohen et al., Active **Compression - Decompression** : A New **Method** of Cardiopulmonary Resuscitation, The Journal of the American Medical Association, Vol. 267, No. 21, June...

...and J. Schultz, P. Coffeen, et al., Circulation, in press, 1994.

The use of a **vacuum** -type cup for actively **compressing** and **decompressing** a patient's **chest** during ACD- **CPR** is described in a brochure of **AMBU** International A/S, Copenhagen, Denmark, entitled Directions for Use of AMBU(R) CardioPump(TM), published...

...773.

DE 24 53 490A discloses a ventilation device for connecting a patient to a **lung** ventilator, but is not intended to impede the airflow to the patient at any stage in its operation. US-A-5,050, 593 discloses the use of one-way **valves** in a triggering mechanism for a respirator.

According to the invention, devices for increasing cardiopulmonary circulation induced by **chest compression** and **decompression** when performing cardiopulmonary resuscitation are provided. The devices may be used in connection with any generally accepted CPR **methods** or with active **compression - decompression** (ACD) CPR **techniques** . Preferably, the devices will be used in connection with ACD-CPR.

Cardiopulmonary circulation is increased according to the invention by impeding air flow into a patient's **lungs** during the **decompression** phase. This increases the magnitude and prolongs the duration of negative **intrathoracic** pressure during **decompression** of the patient' s **chest** , i.e., increases the duration and degree that the **intrathoracic** pressure is below or negative with respect to the pressure in the peripheral venous vasculature. By enhancing the amount of venous blood flow into the heart and **lungs** , since equilibration of **intrathoracic** pressure during **decompression** occurs to a greater extend from enhanced **venous return** rather than rapid inflow of gases into the **chest** via the patient's airway, cardiopulmonary circulation is increased.

A specific embodiment further provides means for impeding air from leaving the **lungs** during **compression** of the patient's **chest** to further enhance cardiopulmonary circulation by enhancing positive **intrathoracic** pressure during the **compression** phase.

When performing cardiopulmonary resuscitation to enhance circulation according to the invention, an operator **compresses** a patient's **chest** to force blood out of the patient's **thorax** . The patient's **chest** is then **decompressed** to induce venous blood to flow into the heart and **lungs** from the peripheral venous vasculature either by actively lifting the **chest** (via ACD-CPR) or by permitting the **chest** to expand due to its own elasticity (via conventional CPR). During the **decompression** step, air flow is impeded from entering into the patient's **lungs** which enhances negative **intrathoracic** pressure and increases the time during which the **thorax** is at a lower pressure than the peripheral venous vasculature. Thus, venous blood flow into the heart and **lungs** from the

peripheral venous vasculature is enhanced. This is because the **intrathoracic** pressure equilibrium during **decompression** occurs as a result of enhanced **venous return** rather than from inflow of air via the trachea. In a particular embodiment, **compression** and **decompression** of the patient's **chest** may be accomplished by pressing an applicator body against the patient's **chest** to **compress** the **chest** , and lifting the applicator to actively expand the patient's **chest** .

An apparatus for enhancing cardiopulmonary circulation comprises an improved endotracheal tube having a flow restrictive element for impeding air flow from the patient's **lungs** during **chest decompression** . The invention may provide a **compressible** structure having the flow restrictive element included in or attached to an opening of the **compressible** structure to impede the flow of gases to the patient's **lungs** . Also, a connector is provided for interfacing the **compressible** structure to the patient, preferably by attaching a facial mask or endotracheal tube to the...

...portions of the specification and drawings.

In the drawings:

Fig. 1 is a graph illustrating **thoracic** pressure changes over time when **compressing** and **decompressing** a patient's **chest** according to the present invention.

Fig. 2A is a schematic view illustrating air flow through a ventilation circuit when **compressing** a patient's **chest** according to the present invention.

Fig. 2B is a schematic view illustrating air flow through a ventilation circuit when **decompressing** a patient's **chest** according to the present invention.

Fig. 3 is a schematic illustration of a first alternative embodiment of a device for impeding air flow into a patient's **lungs** according to the present invention.

Fig. 4A is a schematic illustration of a second alternative embodiment of the device for impeding air flow into a patient's **lungs** according to the present invention.

Fig. 4B is a schematic illustration of the device in...

...a common inhalation/exhalation port.

Fig. 5A is a schematic view of a one-way **valve** used in the device for impeding air flow according to the present invention.

Fig. 5B is a schematic view of the one-way **valve** in Fig. 5A that is held open after ACD-CPR has ceased.

Fig. 5C is a schematic view of a one-way **valve** that is closed until a threshold pressure is present in the tube according to the present invention.

Fig. 6A is a schematic view of a spring biased inflow **valve** and a spring biased expiration **valve** to be used in accordance with the present invention.

Fig. 6B is a schematic view of Fig. 6A showing the operation of the **valves** during outflow of air.

Fig. 6C is a schematic view of Fig. 6A showing the operation of the **valves** during inflow of air.

Fig. 7 is a schematic view of a single **valve** that is spring biased from both sides to be used as an inflow **valve** and an expiration **valve** according to the present invention.

Fig. 8 is a schematic view of an exemplary embodiment of the device for impeding air flow into a patient's **lungs** according to the present invention.

Figs. 9A-9C are schematic views illustrating another embodiment of the present invention allowing for periodic patient ventilation through a bypassing **valve** .

According to the present invention, devices for increasing cardiopulmonary circulation induced by **chest compression** and **decompression** when performing cardiopulmonary resuscitation are provided. Such devices may be used in connection with any **method** of CPR in which **intrathoracic** pressures are intentionally **manipulated** to improve cardiopulmonary circulation. For instance, the present invention would improve standard manual CPR, "vest" CPR, CPR with a newly described Hiack Oscillator ventilatory **system** which operates essentially like an iron- **lung** -like device, interposed abdominal **compression - decompression** CPR, and active **compression - decompression** (ACD) CPR **techniques** . Although the present invention may improve all such **techniques** , the following description will refer primarily to improvements of ACD-CPR **techniques** in order to simplify discussion. However, the claimed devices are not exclusively limited to ACD-CPR **techniques** .

The proper performance of ACD-CPR to increase cardiopulmonary circulation is accomplished by actively **compressing** a patient's **chest** with an applicator body. Preferably, this applicator body will be a **suction** -type device that will adhere to the patient's **chest** , such as the AMBU(R) CardioPump(TM), available from AMBU International, Copenhagen, Denmark. After the **compression** step, the adherence of the applicator body to the patient's **chest** allows the patient's **chest** to be lifted to actively **decompress** the patient's **chest** . The result of such active **compression - decompression** is to increase **intrathoracic** pressure during the **compression** step, and to increase the negative **intrathoracic** pressure during the **decompression** step thus enhancing the blood-oxygenation **process** and enhancing cardiopulmonary circulation. ACD-CPR **techniques** are described in detail in Todd J. Cohen et al., Active **Compression - Decompression** Resuscitation: A Novel **Method** of Cardiopulmonary Resuscitation, American Heart Journal, Vol. 124, No. 5, pp. 1145-1150, November 1992; Todd J. Cohen et al., Active **Compression - Decompression** : A New **Method** of Cardiopulmonary Resuscitation, The Journal of the American Medical Association, Vol. 267, No. 21, June...

...Circulation, in press, 1994.

The present invention is especially useful in connection with ACD-CPR **techniques** . In particular, the invention improves ACD-CPR by providing devices which impede air flow into a patient's **lungs** to enhance negative **intrathoracic** pressure during the **decompression** of the patient's **chest** , thus increasing the degree and duration of a pressure differential between the **thorax** (including the heart and **lungs**) and the peripheral venous vasculature. Enhancing negative **intrathoracic** pressure with simultaneous impedance of movement of gases into the airway thus enhances venous blood flow into the heart and **lungs** and increases cardiopulmonary circulation.

In a broad sense, the present invention allows for occluding a patient's airway to prevent foreign (outside) air from flowing to a patient's **lungs** during the active **decompression** step of ACD-CPR to enhance and sustain the duration of negative **intrathoracic** pressure and enhance blood oxygenation and cardiopulmonary circulation during both active **decompression** and the subsequent **compression** phase. The patient's airway may be occluded or inflow of gases impeded by any...

...of the present invention allows for allowing impeded air to flow into the patient's **lungs** during the active **decompression** step of ACD-CPR in order to provide some ventilation to the patient while still enhancing the extent and duration of negative **intrathoracic** pressure to enhance blood oxygenation. Impeding air flow to the patient's **lungs** may be

accomplished by any flow restrictive element such as an orifice, a spring biased or other **valve** which is set to open when the negative **intrathoracic** pressure is in the range from about 0 mmHg to about -74 mmHg (about 0 cm H2))O to -100 cm H2))O), a one-way **valve** , or the like. A **valve** designed to open at a threshold pressure value may be either fixed or variable, i.e., the pressure at which the **valve** opens may be adjusted or may be permanently fixed.

Similarly, another aspect of the invention allows for air to be impeded from leaving the patient's **lungs** during **compression** of the patient's **chest** to further enhance cardiopulmonary circulation by enhancing **intrathoracic** pressure during the **compression** phase. Typically, air is impeded from leaving the **lungs** during the **compression** phase when the positive **intrathoracic** pressure is in the range from about 3.7 mmHg to about 37 mmHg (about...

...during ACD-CPR. Ventilation of the patient is performed at about every two to 10 **compressions** , preferably every five **compressions** , thus providing sufficient fresh air for adequate gas exchange with the blood in the **lungs** to the patient. Ventilating the patient may be accomplished by any device or **method** suitable such as by mouth-to-mouth resuscitation, by a **compressible** or collapsible structure, by a ventilatory bag such as the AMBU bag available from AMBU, Copenhagen, Denmark, or the like. Ventilation could also be superimposed on the **compression** phase to further augment positive **intrathoracic** pressure. Furthermore, periodic ventilation could be performed either through the impeding step or by bypassing the impeding step altogether.

Referring now to Fig. 1, a graph illustrating **thoracic** pressure changes over time when **compressing** and **decompressing** the patient's **chest** is shown. Area 10 represents the amount of **thoracic** pressure during the **compression** phase of ACD-CPR. Cross-hatched area 12 represents the negative **thoracic** pressure during the **decompression** step of ACD-CPR without a flow restrictive means to restrict the flow of air into the patient's **lungs** . Double cross-hatched area 14 represents the increase in negative **thoracic** pressure when the patient's airway is occluded according to the present invention during the **decompression** step of ACD-CPR. The significance of the increase in negative **intrathoracic** pressure during the **decompression** step is that more venous blood is forced into the **chest** from the peripheral venous vasculature. Consequently, more blood is allowed to be oxygenated and more blood is forced out of the **chest** during the next **compression** .

Air flow may be impeded to the patient's **lungs** during **decompression** of the patient's **chest** by placing a ventilatory mask over the patient's mouth and nose. The ventilatory mask also has a pressure-responsive **valve** attached to prevent air flow to the patient's **lungs** until the negative **intrathoracic** pressure of the patient reaches a threshold amount. Also attached to the mask and the pressure-responsive **valve** is a ventilatory source to provide ventilation to the patient. The ventilatory source may be...

...is needed, the AMBU bag may be squeezed to force air into the patient's **lungs** . The AMBU bag is described in U.S. -A- 5,163,424.

In an alternative...

...an AMBU bag, is used in connection with an improved endotracheal tube. A pressure-responsive **valve** or other flow restrictive element is placed between the AMBU bag and the endotracheal tube. Preferably, the **valve** will be positioned within a tube that connects the AMBU bag to ... performed on the patient, the endotracheal tube is placed in the patient's trachea. During **decompression** of the patient's **chest** , the

valve prevents air flow to the patient's **lungs** until the **intrathoracic** pressure reaches a threshold amount.

Additionally, the AMBU bag may be used to ventilate the patient at a desired time. Also included in this embodiment is a one-way expiration **valve** . This **valve** allows for expiration of air from the patient during the **compression** step.

In a modification of either of the first two embodiments, an pressure-responsive expiration **valve** may also be inserted between the AMBU bag (or comparable ventilation source) and the mask or endotracheal tube. This **valve** works in a similar manner to the pressure-responsive **valve** which restricts air flow into the patient's **lungs** . However, the pressure-responsive expiration **valve** restricts air flow from the patient's **lungs** during the **compression** step of ACD-CPR. An equivalent **valve** is a **positive end - expiratory pressure** (**PEEP**) **valve** available from **AMBU** International, Copenhagen, Denmark. Use of such an pressure-responsive expiration **valve** during **compression** may further increase **intrathoracic** pressure and thereby force more blood out of the **thorax** .

In another alternative embodiment, an improved endotracheal tube is used to restrict air flow into the patient's **lungs** during the active **decompression** step. Included in the endotracheal tube is a flow restrictive element which operates to impede air from flowing into the patient's **lungs** . When the endotracheal tube is inserted into the patient's trachea and the patient's **chest** is actively **decompressed** , the flow restrictive element impedes air from flowing to the patient's **lungs** slowing the rise in **intrathoracic** pressure and thus enhancing blood oxygenation.

When using the improved endotracheal tube during ACD-CPR...

...the endotracheal tube to force oxygen through the endotracheal tube and into the patient's **lungs** .

Referring now to Fig. 2A, a schematic view illustrating air flow through a ventilation circuit 20 when **compressing** a patient's **chest** according to the present invention is shown. During ACD-CPR, the **chest** is actively **compressed** forcing air out of the **lungs** . This air is allowed to expire through a one-way expiration **valve** 22 within a ventilation circuit 20.

Referring now to Fig. 2B, the same schematic is shown illustrating air flow through the ventilation circuit 20 when **decompressing** the patient's **chest** . When the patient's **chest** is actively **decompressed** , a negative **intrathoracic** pressure is created. When this pressure reaches a threshold amount, the inflow **valve** 24 will open causing air to flow through the ventilation circuit 20 into the patient's **lungs** . Air is allowed into the ventilation circuit 20 through a ventilation **valve** 26 and into a ventilation bag 28. From the ventilation bag 28, the air passes through the inflow **valve** 24 when the negative **intrathoracic** pressure reaches the threshold amount. The ventilation bag 28 is also used to manually ventilate the patient during ACD-CPR as required.

The **method** as discussed in connection with Figs. 2A and 2B requires the **chest** to be **compressed** in the range from about 3.5 cm to 5 cm per **compression** and at a rate from about 60 to 100 **compressions** per minute for adults.

Referring now to Fig. 3, a schematic illustration of a first alternative embodiment of a device 35 for impeding air flow into a patient's **lungs** according to the present invention is shown. The device 35 comprises an endotracheal tube 36...

...can comprise any type of ventilation source capable of ventilating the patient such as a **compressible** or collapsible structure. Preferably,

the ventilation bag 28 consists of an AMBU bag. Attached or connected to the end of the ventilation bag 28 is a one-way ventilation **valve** 26. The ventilation **valve** 26 serves to introduce air into the device 35. Attached or connected to the transition tube 38 is an inflow pressure-responsive **valve** 24. The inflow **valve** 24 is biased so that it opens when the negative **intrathoracic** pressure in the patient's **chest** reaches a threshold amount. As shown, only one inflow **valve** 24 is included in the device 35. However, the invention is not limited to only one inflow **valve** 24. Alternatively, a plurality of inflow **valves** 24 could be connected in series along the ventilation tube 38. The inflow **valve** 24 is also not limited to being connected in the center of the transition tube 38, but may be positioned anywhere along the transition tube 38. The inflow **valve** 24 could be permanently attached to the ventilation bag 28 or transition tube 38 or could be detachable. Alternatively, the inflow **valve** 24 could be connected to the ventilation bag 28 itself or to the endotracheal tube 36.

The device 35 also contains a one-way expiration **valve** 22 which allows for air to be expired from the patient's **lungs** . This generally occurs during the **compression** phase of ACD-CPR. To insure that the air expired from the patient's **lungs** will exit through the expiration **valve** 22, a one-way fish mouth **valve** 37 (the preferred **valve**) or any other type of one-way **valve** can be placed between the inflow **valve** 24 and the expiration **valve** 22. Alternatively, the inflow **valve** 24 itself may be configured as a one-way **valve** . In either case, air flowing from the endotracheal tube 36 toward the ventilation bag 28 will be forced to expire through the expiration **valve** 22.

The device 35 may be further modified to include a pressure-responsive expiration **valve** (not shown) located between the endotracheal tube 36 and the transition tube 38. The pressure-responsive expiration **valve** works in a reverse manner to that of the inflow **valve** 24. Specifically, the pressure-responsive expiration **valve** is biased so that during the **compression** step of ACD-CPR, air will be allowed to expire from the patient's **lungs** only when the **intrathoracic** pressure reaches a threshold amount. The increase in **intrathoracic** pressure caused by the pressure-responsive expiration **valve** during **compression** may assist in forcing more blood out of the **thorax** and reduce atelectasis of the **lungs** .

The purpose of the ventilation **bag** 28 is to provide ventilation to the patient during ACD- **CPR** . When the ventilation **bag** 28 comprises an **AMBU** **bag** or similar bag used for ventilation, ventilation of the patient may be performed by merely squeezing the AMBU bag with a human hand. This forces air to the patient's **lungs** as desired.

Referring to Fig. 4A, a second alternative embodiment of the device for impeding air flow into a patient's **lungs** according to the present invention is shown. This particular embodiment is a modified and improved ... .

...inflow lumen 42. Located within outflow lumen 40 is a one-way pressure-responsive expiration **valve** 44 which operates in a manner similar to that discussed in connection with Fig. 3, except that the expiration **valve** 44 is specifically designed as a one-way **valve** . Located within inflow lumen 42 is a one-way pressure-responsive inflow **valve** 45 which operates to impede air flow to the **lungs** as discussed in connection with Fig. 3, except that the inflow **valve** 45 is also specifically designed as a one-way **valve** . Also shown in inflow lumen 42 and outflow lumen 40 is an O-ring 46 which will be discussed subsequently. Inflow **valve** 45 and expiration **valve** 44 are designed as one-way **valves** so that during the **compression** phase, air can only be expired from the patient through the endotracheal tube 36 when the

intrathoracic pressure reaches a threshold amount. At that moment, expiration **valve** 44 opens and air expires from the patient through the outflow lumen 40. During **decompression** , air cannot flow through the endotracheal tube 36 to the patient's **lungs** until the negative **intrathoracic** pressure reaches a threshold amount. At that moment, inflow **valve** 45 opens allowing air to flow through inflow lumen 42 to the patient's **lungs** . Air is prevented from entering through the outflow lumen 40 because of the one-way expiration **valve** 44.

Ventilation is possible with the embodiment disclosed in Figs. 4A and 4B if the...

...through the inflow lumen 42, through the endotracheal tube 36, and to the patient's **lungs** . In this embodiment, expiration **valve** 44 is designed so that during ventilation, expiration **valve** 44 will remain temporarily closed preventing air flowing through inflow lumen 42 escape through outflow lumen 40.

Fig. 5A is a schematic view of a one-way inflow **valve** 45 used in a device for impeding air flow according to the present invention. The inflow **valve** 45 operates so as to allow air only to flow in one direction. As shown, the spring biased inflow **valve** 45 is completely open. However, the invention also functions properly if the spring biased inflow **valve** 45 or the spring biased expiration **valve** 44 are not fully open. Upon successful completion of ACD-CPR, the O-ring 46 that is positioned above the inflow **valve** 45 is repositioned so that inflow **valve** 45 is held open as shown in Fig. 5B. Such a positioning of O-ring ...

...flow to the patient once there is a return of spontaneous circulation and the inflow **valve** 45 is no longer needed. An O-ring 46 is also used in a similar manner to lock the one-way expiration **valve** 44 in an open position upon return of spontaneous circulation. Fig. 5C illustrates the one-way inflow **valve** 45 in a closed position. When closed, the inflow of air through the inflow **valve** 45 is occluded.

Fig. 6A illustrates an inflow **valve** 47 that is spring biased and an expiration **valve** 48 that is also spring biased. The inflow **valve** 47 and the expiration **valve** 48 are connected in series and may be used in the first alternative embodiment as...

...discussed following in connection with Fig. 8. As shown in Fig. 6C, during the active **decompression** step, the inflow **valve** 47 is biased such that it will open when the negative **intrathoracic** pressure reaches a threshold amount. During the **compression** phase of ACD-CPR the expiration **valve** 48 will open to allow air to expire from the patient's **lungs** when the **intrathoracic** pressure within the patient's **chest** reaches a threshold amount as shown in Fig. 6B. Since neither inflow **valve** 47 nor expiration **valve** 48 are one-way **valves** , a fish mouth **valve** 37 used in connection with a one-way expiration **valve** 22 as discussed in connection with Fig. 3 must be used. Other **valves** designed upon a similar principle as the fish mouth **valve** combination with a one-way expiration **valve** could also be used. Only one inflow **valve** 24 and one positive end pressure **valve** 44 are shown in Figs. 6A-6C. However, a plurality of inflow **valves** 47 and/or expiration **valves** 48 may be connected in a permanent or detachable manner in series to impede the inflow and outflow of air.

Although the **valves** in Figs. 6A-6C are shown as being spring-biased, any other **valves** designed upon a similar principle would work equally as well. The use of such valves as disclosed in Figs. 6A-6C is only one embodiment and **valves** constructed according to various other **methods** and materials is also within the scope of the invention.

As shown in Fig. 7, the inflow **valve** 47 and the expiration **valve** 48 may be combined into one joint **valve** 49 as shown. The joint **valve** 49 will operate in a manner similar to the two **valves** 47 and 48 as described in connection with Fig. 6.

Fig. 8 illustrates an exemplary embodiment for impeding air flow into a patient's **lungs** according to the present invention. As shown, the device 51 comprises a ventilation bag 28 that is connected to a facial mask 52 by an inflow **valve** 24 and an expiration **valve** 22. Although the facial mask 52 is shown connected to the ventilation bag 28, the...

...52 can be used alone or in connection with the ventilation bag. Between the inflow **valve** 24 and the expiration **valve** 22 is a one-way fish mouth **valve** 37 or any other type of one-way **valve** to prevent air from exiting the patient's **lungs** and flowing to the ventilation bag 28. The ventilation bag 28 also contains a one-way ventilation **valve** 26 for allowing air to inflow into the device 51. The exemplary embodiment operates in...

...plastic material and may or may not be attached to the device 51.

During the **decompression** phase of ACD-CPR, air is prevented from entering into the patient's **lungs** through the threshold inflow **valve** 24 thus increasing the negative **intrathoracic** pressure. During the **compression** phase, air is allowed to expire from the patient's **lungs** through the expiration **valve** 22. Also, the patient can be ventilated during ACD- **CPR** by manually squeezing the ventilation **bag** 28. Consequently, the preferred embodiment serves to enhance **cardiopulmonary circulation** by increasing the negative **intrathoracic** pressure to force more blood into the **chest** from the peripheral venous vasculature.

Figs. 9A - 9C show another embodiment of the present invention...

...that is connected to the patient. The ventilation tube 60 has a one-way bypass **valve** 66 and a one-way pressure responsive **valve** 68. The ventilation tube 60 may also have a manual switch 70 attached to the bypass **valve** 66 and extending through a side of the ventilation tube 60. As shown in Fig...

...70 may be set in a closed position so that the one-way pressure responsive **valve** 68 opens when the threshold pressure of the **valve** 68 has been exceeded. At this point, the **valve** 68 opens allowing for ventilation of the patient. As shown in Fig. 10B, the one-way pressure responsive **valve** 68 may be bypassed altogether by manually placing the switch 70 in the open position so that the bypass **valve** 66 is opened allowing air to flow to the patient. Fig. 10C illustrates the operation of the bypass **valve** 66 with the switch 70 in an inactive mode. Here, the rescuer performing ventilation may do so without added resistance from the impedance step as in Fig. 10A. Instead, bypass **valve** 66 opens only when the pressure at the proximal end of the tube 62 is...

...pressure (0 mmHg), preferably in a range from about 0 mmHg to 5 mmHg. During **decompression** of the patient's **chest** , the one-way bypass **valve** 66 remains closed unless atmospheric pressure is exceeded. Thus, the patient is ventilated only when...

...of the tube 62 to exceed atmospheric pressure. The function of the one-way bypass **valve** 66 may be performed by many different threshold **valve** designs which are known in the art.

Although the foregoing invention has been described in...

...CLAIMS means (24) is exceeded,

whereby when performing cardiopulmonary resuscitation the extent and duration of negative **intrathoracic** pressure during the **decompression** of the patient's **chest** is enhanced in order to enhance venous blood flow into the heart and **lungs** from the peripheral venous vasculature.

2. The apparatus of claim 1, wherein the impeding means (24) further comprises a pressure-responsive **valve** , wherein the 1valve is biased to open to permit the inflow of air when the **intrathoracic** pressure falls below a threshold level in the range from 0 mm Hg to about...

...to 100 cm H2))O).

3. The apparatus of claim 2, wherein the pressure-responsive **valve** is in a lumen of an endotracheal tube.

4. The apparatus of any one of...

24/3,K/23 (Item 23 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00640834
Method **for supplying fresh gas during manual ventilation and a ventilator** system **for carrying out the** method
Verfahren und Gerate fur Frischgasabgabe bei manueller Ventilation
Procede et dispositif pour distribuer du gaz frais pendant ventilation manuelle

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SPEC B	(English)	9909	6381
Total word count - document A			0
Total word count - document B			9917
Total word count - documents A + B			9917

Method **for supplying fresh gas during manual ventilation and a ventilator** system **for carrying out the** method
INTERNATIONAL PATENT CLASS: **A61M-016/00** ...

... **A61M-016/08**

...ABSTRACT A1
The invention relates to a **method** for supplying fresh gas in manual ventilation of a patient and a ventilator **system** (2) for carrying out the **method** , the supply of fresh gas to a breathing bag (8) being regulated. During inspiration, the...
...senses when the patient exhales, and an identical flow of gas is fed to the **system** via an inspiratory **valve** (26), said flow of fresh gas streaming into the breathing bag (8) and preventing expired gas from entering the breathing bag (8). An expiratory **valve** simultaneously opens to conduct expired gas out of the **system** . (see image in original document)

SPECIFICATION This invention relates to a **method** for supplying fresh gas, for use with a ventilator **system** for manual ventilation of a patient in which a breathing bag is squeezed to impose an inspiration on the patient.

The invention also relates to a ventilator **system** for carrying out the **method** .

Ventilator **systems** are used for facilitating, supporting or imposing

inspiration and expiration on a patient. Manual ventilation...

...the breathing bag is connected to the patient's airways without any intermediate pressure exchange **system** , the physician is able to feel the response of the **lungs** to the action of the breathing bag. In other words, the physician can be said to communicate directly with the **lungs** . This is essential, particularly in anesthesia where the anesthetist wishes to control the entire respiratory **process** himself/herself.

In US-A-3,794,027 is described a manual ventilation **system** for anesthesia. The **system** comprises a breathing bag which the physician squeezes to push air through a patient tube...

...feel the way the patient is breathing. The bag must be periodically detached from the **system** , emptied and refilled with fresh gas to replace the gas re-breathed a plurality of times by the patient. In the patient tube there are also two check **valves** , near the patient, which control the direction of gas flow to and from the patient...

...an adverse effect on surgical staff.

The object of the invention is to achieve a **method** which avoids the above-described disadvantages and in which the patient does not re-breathe...

...own expired gas, with no loss of the physician's ability to communicate with the **lungs** .

Another object of the invention is to achieve a ventilator **system** for carrying out the **method** and which facilitates control of gas flow in the patient tube, making check **valves** and gas absorbers unnecessary.

One such **method** is achieved in accordance with the invention in that fresh gas is fed into the...

...of expired gas, and gas expired by the patient is conducted out of the ventilator **system** .

By replacing the gas inspired by the patient from the breathing bag with fresh gas...

...compared to the situation when the patient expires directly into the breathing bag. This filling **method** works equally well when the patient breathes spontaneously.

A refinement of the **method** is achieved in accordance with a preferred embodiment of the invention in that a parameter...

...Expired gas is prevented from entering the breathing bag and forced out of the ventilator **system** . The slightest change in expiratory flow from the patient affects the parameter measured, and control...

...the physician, i.e. it will feel to the physician as if the patient's **lungs** were communicating directly with the breathing bag, even though expired gas is conducted out of the ventilator **system** . Since expired gas is not re-breathed, no carbon dioxide filter is needed, and control ...

...of gas flow is achieved by control of the flow of fresh gas, making check **valves** unnecessary for controlling the direction of the gas flow.

In this context, it is an...bag has refilled and is again ready for the inspiration phase.

A refinement of the **method** is obtained in accordance with the invention in that an additional parameter is measured for...

...control of the flow of fresh gas and/or starting a functional check on

the **method** , an alarm being generated and/or an alternative ventilation mode started if at least one...

...regulating the supply of fresh gas. The safety feature obtained through functional control of the **method** means that if a fault occurs in e.g. measurement of the control parameter so...

...completely, an alarm is generated drawing the staff's attention to the fault. Alternately, the **system** could be automatically switched to some other **method** , involving the monitoring of some other control parameter, or some other ventilation mode, e.g. mechanical ventilation.

A ventilator **system** for carrying out the **method** is achieved by in accordance with the invention when the ventilator **system** as defined in claim 5.

It is an advantage if the ventilator **system** is designed so the ventilator unit comprises a controllable inspiratory **valve** connected to one end of the patient tube, a controllable expiratory **valve** connected to the other end of the patient tube and a control device connected to the parameter detector and to the **valves** for the purpose of controlling the **valves** according to the parameter.

In principle, it is sufficient for carrying out the **method** if the inspiratory **valve** passes a continuous flow and the ventilator **system** is controlled by regulation of the expiratory **valve** . The ventilator unit can be devised so the control device constitutes an integral part of ...

...further comprises a second detector for sensing gas flow or gas pressure at the inspiratory **valve** and a third detector for sensing gas flow or gas pressure at the expiratory **valve** , whereby the control device controls the **valves** according to the gas flows and/or gas pressures measured by the detectors. Measurement of flows, or pressures at the **valves** , makes it possible to control these **valves** more exact.

A refinement of the ventilator **system** is achieved in accordance with the invention in that the detectors sense gas flow, and...

...the gas volumes passing the respective detector during expiration, whereby the control device controls the **valves** so the determined gas volumes are essentially identical.

This ensures that the expired volume of...

...measurement of the gas flows also makes possible rapid detection of minor leaks in the **system** .

In this context, it is an advantage if the control device continuously zeroes the first...

...with a long time constant, lasting up to several minutes.

A refinement of the ventilator **system** is achieved in accordance with the invention in that the control device controls the **valves** so a passing flow of fresh gas flows through the patient tube during expiration.

Passing...

...flushes out any expired gas left in the patient tube between the breathing bag and **lungs** , i.e. dead space is reduced throughout the entire **system** .

Here, it is an advantage if the ventilator **system** is devised so the control device controlls the **valves** so the flow of gas at the inspiratory **valve** is less than the flow of gas at the expiratory **valve** and a first pressure detector measures pressure in the breathing bag, whereby the control device regulates the inspiratory **valve** , when

pressure in the breathing bag drops below a first defined pressure, so a flow...

...the breathing bag is fed into the patient tube.

This would thereby gradually regulate the **system** towards increasingly lower pressure until a filling pressure is achieved. This regulatory **procedure** prevents the build-up of pressure in the **system** . Pressure in the breathing bag can be measured directly by a manometer in the breathing...

...the patient tube.

Alternately, it may be advantageous in certain instances to devise the ventilator **system** so the control device controls the **valves** so the flow of gas at the inspiratory **valve** is greater than the flow of gas at the expiratory **valve** and a second pressure detector measures pressure in the patient tube, whereby the control device regulates the expiratory **valve** , when pressure in the patient tube exceeds a second defined pressure, causing pressure to drop.

This would thereby gradually regulate the **system** towards a definable maximum pressure, i.e. a pop-off pressure, keeping the patient from being exposed to pressures greater than this.

A refinement of the ventilator **system** is achieved in accordance with to the invention in that the control device controls the **valves** so a passing flow of fresh gas flows through the patient tube during inspiration.

In the same way as during expiration, a flow of gas may be fed through the **system** during inspiration. A flow of gas can naturally be present even throughout the entire inspiratory...

...out any residual gas expired by the patient.

In order to improve control of the **system** , it is an advantage if the breathing bag comprises a flow **valve** which is controllable by the control device. If, for example, the inspiratory **valve** is slow, the flow **valve** could be used for obtaining the most exact gas flow possible.

An advantageous refinement of the ventilator **system** is achieved in accordance with the invention in that an additional detector is installed in...

...signal meets at least a second defined condition, whereby the control device sets the ventilator **system** in a safe state if the measurement signal meets the second defined condition.

In this...

...of her/his expired gas. Moreover, this would result in a monitoring of the ventilator **system** 's function. If the new parameter's measurement signal meets certain conditions, e.g. that...

...defined second value for a specific period of time, the control device sets the ventilator **system** in a safe state. Safe state means that the device is transferred to a state...

...the device. The device could even automatically perform some safety measure, such as opening a **valve** , changing the control parameter or changing the ventilation mode. Even when it performs an automatic...

...from a detector measuring another parameter could be used as a control parameter, or the **system** could be switched to another ventilation mode, e.g. from manual to mechanical ventilation. In...

...generator to activate an alarm and/or a switch to switch control of the ventilator **system** to mechanical ventilation or to some other parameter.

The invention is described in greater detail...

...referring to five figures in which:

FIG. 1 shows a first embodiment of the ventilator **system** according to the invention;

FIG. 2 is a block diagram of a control device in the ventilator **system** ;

FIG. 3 illustrates a first regulation the ventilator **system** is capable of performing;

FIG. 4 illustrates a second regulation the ventilator **system** is capable of performing and

FIG. 5 shows a second embodiment of the ventilator **system** according to the invention.

The ventilator **system** 2 comprises a ventilator unit 4, a patient tube 6 and a breathing bag 8...

...When the manual ventilation mode is set on the control panel 10, a breathing bag **valve** 14, which can even be a manually adjustable **valve** , opens. A physician can **compress** the breathing bag 8 by squeezing it, thereby increasing pressure in the patient tube 6 so gas is forced into the patient's **lungs** . When the physician relaxes pressure on the breathing bag 8, gas can flow back, and...

...With this ventilation mode, the physician is continuously able to feel the action of the **lungs** and exercise complete control over the patient's respiration.

To keep the patient from re-breathing expired gas, the ventilator **system** 2 is controlled during spontaneous breathing and manual ventilation of the ventilator unit 4 in...

...18 shown in greater detail in FIG. 2.

The ventilator unit 4 also containsan inspiratory **valve** 26 and an expiratory **valve** 30, both controlled by the control device 18 and a first flow meter 32, a...

...breathing bag 8, it emits a first control signal which is sent to the inspiratory **valve** 26 via a first A/D converter 24, and a second control signal which is sent to the expiratory **valve** 30 via a second A/D converter 28. The **valves** 26, 30 are opened to permit the passage of a flow of gas according to the control signals.

The flow of gas through the inspiratory **valve** 26 is measured in the first flow meter 32, whose measurement signal is sent to...

...the onset of expiration, as described above. The control device 18 then opens the inspiratory **valve** 26 and the expiratory **valve** 30, regulating the flow in them so they are as close as possible to the expired flow. As a result, the flow of gas through the inspiratory **valve** 26 keeps the flow of expired gas from filling the breathing bag 8 and fills the breathing bag 8 with fresh gas. Expired gas is thereby forced out of the **system** through the expiratory **valve** . Changes in expiratory flow from the patient are immediately recorded by the pressure gradient detector 16, enabling the control unit 18 to correct control of the **valves** 26, 30. The breathing bag 8 is thereby filled with fresh gas in a way...

...patient were breathing directly into the breathing bag 8.

In order to control the expiratory **valve** 30 as accurately as possible, the flow of gas at the expiratory **valve** is measured in the

second flow meter 36, and the measurement signal is sent to...

...with enough fresh gas, the microprocessor 22 can integrate the flows measured at the inspiration **valve** 26, the expiration **valve** 30 and the breathing bag 8. The integrals designate the volume of gas passed, and the control unit 18 can regulate the **valves** 26, 30 so the volumes are of equal magnitude.

The pressure gradient detector 16 is in this embodiment zeroed continuously to increase the **system** 's ability to measure small flows. This can be compared to an AC coupling with...

...of the changes registered. The pressure gradient detector 16 is zeroed before the breathing bag **valve** 14 opens in order to supply an reference output for flow at the breathing bag 8.

Moreover, pressure is measured in the patient tube 6 at the inspiratory **valve** 26 in the first pressure detector 33, whose measurement signal is fed to the microprocessor...

...the breathing bag 8 drops too much, additional fresh gas is supplied via the inspiratory **valve** 26.

The second pressure detector 40 is located by the expiratory **valve** 30 in the patient tube 6 and senses pressure at the expiratory **valve** 30. The measurement signal is sent to the microprocessor 22 via a fifth signal former 42. If pressure at the expiratory **valve** 30 exceeds a defined maximum pressure, i.e. the pop-off pressure, the expiratory **valve** 30 opens further in order to reduce excess pressure in the patient tube 6. The aim is to limit the buildup of pressure in the patient's **lungs** .

The microprocessor 22 can also control the breathing bag **valve** 14 via a third D/A converter 44. Use of this **valve** may be appropriate if the inspiratory **valve** 26 is not fast enough.

FIGURES 3 and 4 schematically illustrate two ways in which the microprocessor 22 can control the **valves** 26, 30. The signals are designated as follows: Ppopoff)) is the pop-off pressure, which...

...measured by the second presure detector 40, (PHI)E)) is the flow at the expiratory **valve** 30, (PHI)H)) is the breathing bag flow 8, (DELTA)PH)) is fall in the...during spontaneous breathing and (PHI)Iset)) is the reference value for flow at the inspiratory **valve** 26.

A regulation sufficient for controlling the supply of fresh gas to the breathing **valve** 8 during the expiratory phase is illustrated in FIG. 3. The value for expiratory flow...

...is sent to a first regulator 48 which sends a control signal to the expiratory **valve** 30 via the second D/A converter 28 in an effort to achieve an expiratory...

...to form a fault signal used by the first regulator 48 to control the expiratory **valve** 30. Pressure PE)) in the patient tube 6 at the expiratory value 30 is monitored...

...logic 52 first switches a first switch 54, and then assumes control of the expiratory **valve** 30.

Another monitoring performed concerns pressure in the breathing bag 8. As previously noted, filling...

...bag 8. If pressure in the breathing bag drops below filling pressure Pf)), the inspiratory **valve** 26 will admit an additional influx of fresh gas to fill the breathing bag 8...

...adder 56 to the pressure PI)) measured in the patient tube 6 at the inspiratory **valve** 26. The fault signal obtained is sent to a second

control logic 58 capable of...

...is typically- 5cm H2))O in relation to atmospheric pressure. During the expiratory phase, the **system** again automatically switches to normal pressure regulation. This takes place when the second control logic...

...PPEEP)) - (DELTA)PH))), i.e. when spontaneous breathing is deemed to be present.

The ventilator **system** 2 can also be controlled so it supplies a passing flow of gas in the...

...both expiration and inspiration. The passing flow of gas flushes expired gas out of the **system** , thereby reducing the **system** 's dead space. To facilitate control of the passing flow of gas when the breathing bag 8 is filled, pressure in the **system** can either be regulated against the filling pressure Pf)) for the breathing bag or against the **system** 's maximum pressure Ppopoff)).

In the first instance, inspiratory flow is regulated so it is less than expiratory flow. For example, the passing flow at the inspiratory **valve** could be reduced to 2 liters/minute when the total passing flow is 3 liters...

...PH)), drops below the filling pressure Pf)) plus the end expiratory pressure PPEEP)), the inspiratory **valve** 26 opens to fill the breathing bag 8.

In the second instance, when the **system** is regulated against the pop-off pressure Ppopoff)), inspiratory flow is instead increased so it ...

...flow. When pressure in the patient tube PE)) exceeds pop-off pressure Ppopoff)), the expiratory **valve** 30 opens to bleed off surplus gas.

Since all flows are measured or calculated in the ventilator **system** 2, the microprocessor 22 can quickly determine whether the patient should be disconnected from the **system** , then stopping all gas flows. This is particularly important in conjunction with the administration of...

...anesthetic into the operating theatre.

In the corresponding manner, leakage from different parts of the **system** can be easily detected. Regulation of the entire **system** can even be managed according to readings from pressure sensors, since pressure and flow in the **system** are directly interrelated, and the value of one can be established from the value for the other.

A digitally controlled **system** has been described in the embodiment, but the **system** can also be devised as an analog circuit.

A second embodiment of the ventilator **system** is shown in FIG. 5. The ventilator **system** 64 comprises a ventilator unit 66, which could consist of e.g. a Servo Ventilator...

...66A and an expiratory section 66B. In the inspiratory section 66A there is an inspiration **valve** 86 which regulates the flow of gas into the patient tube 68, and in the expiratory section 66B there is an expiratory **valve** 88 which regulates the flow of gas out of the patient tube 68. A number...

...are installed between the control device 72 and the ventilator unit 66 for controlling the **valves** 86, 88. Control signals for the ventilation phases, i.e. whether the **valves** 86, 88 are to be open or closed and whether the **valves** 86, 88 are to be controlled according to pressure or flow, are sent to the ventilator unit 66 via first control line 90. When the **valves** 86, 88 are to be controlled according to flow, a first flow

control signal is...

...is sent to the expiratory section 66B via a third control line 94. When the **valves** 86, 88 are to be controlled according to pressure, a first pressure control signal is...

...can perform the regulation and control described in conjunction with FIGS. 1-4.

The ventilator **system** 64 functions as follows: In normal ventilation, a breathing bag **valve** 108 is closed, and the **system** operates like a normal ventilator. The breathing bag **valve** 108 is open in manual ventilation of the patient.

During the inspiratory phase, the control device 72 controls the ventilator unit 66 so the inspiratory **valve** 86 and the expiratory **valve** 88 are closed. The patient's inspiration is monitored by the physician who squeezes the breathing bag 70 which, since the **valves** 86, 88 are closed, is in direct contact, like a communicating vessel, with the patient's **lungs** . During inspiration, the physician can therefore feel the pressure in the patient's **lungs** in the breathing bag 70.

During expiration, the physician relaxes pressure on the breathing bag ...

...to the control device 72 which now controls the ventilator unit 66 so the inspiratory **valve** 86 and the expiratory **valve** 88 admit an inspiratory flow and an expiratory flow respectively of the same magnitude as...

...pressure detector 82. The breathing bag 70 then fills with fresh gas from the inspiratory **valve** 86. The patient's expired gas is thereby unable to flow into the breathing bag 70 and is conducted away through the expiratory **valve** 88. Gas outflow through the expiratory **valve** 88 has the same flow profile as when the patient's **lungs** are emptied of gas. So the patient's **lungs** , even during expiration, will also feel to the physician as though they were communicating directly with the breathing **valve** 70, even though the expired volume is controlled via the expiratory **valve** 88. In other words, the physician controls the patient's respiration during both inspiration and...

...volume of flow into the breathing bag 70 during the same expiratory phase. This regulatory **method** effectively prevents the patient's expired gas from reaching the breathing bag 70. The inspiratory...

...constant flows of gas from an external source of gas can be connected to the **system** .

In order to enhance patient safety, the ventilator **system** 64 contains a CO2)) detector 100 placed in the patient tube 68 by the patient...

...replaced with fresh gas. If this is not the case, there issome fault in the **system** , and the alarm is activated. To ensure that the alarm is triggered, even if the...

...very steeply when the patient begins exhaling, this circumstance can be used to trigger the **system** to start refilling the breathing bag 70 with fresh gas. Here, the filling **procedure** can be controlled in the way described above.

A direction-dependent flow meter 104 placed...

...signal line 106. The direction-dependent flow meter 104 senses gas flows towards the breathing **valve** 70. The direction-dependent flow meter 104 should only intermittently detect flow during the expiratory...

...detection lasting a given period of time, e.g. a few seconds, indicates that the **system** is not working properly, and an alarm is activated.
The measurement signal from the direction...

...can still be sustained.
Alternately, the control device 72 can shift to controlling the ventilator **system** 64 according to some other control parameter, such as the measurement signal from the direction-dependent flow meter 104. This control redundancy for the control device 72 optimizes the ventilator **system** 's 64 function and patient safety.
The CO2)) detector 100 can be replaced, without any...

CLAIMS 1. A **method** , for use with a ventilator **system** for manual ventilation of a patient in which a breathing bag is squeezed to impose...

...of expired gas, and gas expired by the patient is conducted out of the ventilator **system** (2).
2. A **method** of claim 1, characterised in that a parameter related to the patient's expiration is...

...breathing bag (8), and gas flow is controlled according to the measured parameter.
3. A **method** of claim 2, characterised in that one of the parameters gas flow, temperature, relative gas...

...concentration of a specific gas is measured and serves as the control parameter.
4. A **method** of claim 2 or 3, characterised in that an additional parameter is measured for starting control of the flow of fresh gas and/or starting a functional check on the **method** , an alarm being generated and/or an alternative ventilation mode started if at least one defined condition is met.
5. A ventilator **system** (2; 64), for manual ventilation of a patient, comprising a patient tube (6; 68) connectable...

...bag (8; 70), and gas expired by the patient is conducted out of the ventilator **system** (2; 64).
6. A ventilator of claim 5, characterised in that the ventilator unit (4; 66) comprises a controllable inspiratory **valve** (26; 86) connected to one end of the patient tube (6; 68), a controllable expiratory **valve** (30; 88) connected to the other end of the patient tube (6; 68) and a...

...device (18; 72) connected to the parameter detector (16; 82, 100, 104) and to the **valves** (26, 30; 86, 88), whereby the control device (18) controls the **valves** (26, 30; 86, 88) according to the parameter.
7. A ventilator **system** of claim 6, characterised in that the ventilator unit (4) comprises a second detector (32) for sensing gas flow or gas pressure at the inspiratory **valve** (26) and a third detector (36) for sensing gas flow or gas pressure at the expiratory **valve** (30), whereby the control device (18) controls the **valves** (26, 30) according to the parameters gas flows or gas pressures measured by the detectors (16, 32 36).
8. A ventilator **system** of claim 7, characterised in that the detectors (16, 32, 36) sense gas flow, and...

...the respective detector (16, 32, 36) during expiration, whereby the control device (18) controls the **valves** (26, 30) so the determined gas volumes are essentially identical.

9. A ventilator **system** of any of claims 5 - 8, characterised in that the control device (18) continuously zeroes the parameter detector (16).

10. A ventilator **system** of any of claims 6 - 9, characterised in that the control device (18; 72) controls the **valves** (26, 30; 86, 88) so a passing flow of fresh gas streams through the patient tube (6; 68) during expiration.

11. A ventilator **system** of claim 10, characterised in that the control device (18) controls the **valves** (26, 30) so the flow of gas at the inspiratory **valve** (26) is less than the flow of gas at the expiratory **valve** (30) and a first pressure detector measures pressure in the breathing bag (8), whereby the control device (18) regulates the inspiratory **valve** (26), when pressure in the breathing bag (8) drops below a first defined pressure, so...

...filling the breathing bag (8) is fed into the patient tube (6).

12. A ventilator **system** of claim 10, characterised in that the control device (18) controls the **valves** (26, 30) so the flow of gas at the inspiratory **valve** (26) is greater than the flow of gas at the expiratory **valve** (30), and a second pressure detector (40) measures the pressure in the patient tube (6), whereby the control device regulates the expiratory **valve** (30), when pressure in the patient tube (6) exceeds a second defined pressure, causing pressure to drop.

13. A ventilator **system** of any of claims 5 - 12, characterised in that the control device (18) controls the **valves** (26, 30) so a passing flow of fresh gas flows through the patient tube (6) during inspiration.

14. A ventilator **system** of any of claims 5 - 13, characterised in that the breathing bag (8) comprises a flow **valve** (14) which is controllable by the control device (18).

15. A ventilator **system** of any of claims 5 - 14, characterised in that an additional detector (100, 104) is...signal meets at least a second defined condition, whereby the control device sets the ventilator **system** (64) in a safe state if the measurement signal meets the second defined condition.

16. A ventilator **system** of claim 15, characterised in that the control device (72) comprises a first comparator using...

...generator to activate an alarm and/or a switch to switch control of the ventilator **system** (64) to mechanical ventilation or to some other parameter.

24/3,K/27 (Item 27 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00280742
CARDIOPULMONARY RESUSCITATION DEVICE.
KARDIOPULMONARE WIEDERBELEBUNGSVORRICHTUNG.
DISPOSITIF DE REANIMATION CARDIO- PULMONAIRE .
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INTERNATIONAL PATENT CLASS: **A61M-016/08** ; **A61M-016/00** ; A61H-031/00
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No A-document published by EPO
LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	EPBBF1	680
CLAIMS B	(German)	EPBBF1	600
CLAIMS B	(French)	EPBBF1	788
SPEC B	(English)	EPBBF1	4525
Total word count - document A			0
Total word count - document B			6593
Total word count - documents A + B			6593

DISPOSITIF DE REANIMATION CARDIO- PULMONAIRE .
INTERNATIONAL PATENT CLASS: **A61M-016/08** ...

... **A61M-016/00**

...SPECIFICATION due to inadequate cardiac output. In adults, this arrest is most often due to (min) **cardiac arrest** (min) (e.g. **myocardial infarction**), whereas in children it is more often secondary to (min)respiratory arrest(min) or hypoxia e.g. asphyxia.
Basic CPR is the accepted **technique** out of hospital where advanced life support **systems** are not available. Examples of situations where basic CPR is essential include drowning, trauma, drug overdose, and **myocardial infarction** .
It has been shown that Basic CPR, when performed adequately, will satisfy the physiological criterion...

...tissues, in order to preserve their cellular function.
Basic CPR can be performed by two **techniques** : (a) (min)Old(min) CPR and (b) (min)New(min) CPR, which will be described...

...follows:
(a) (min)Old(min) CPR is well-established in the medical literature. The basic **technique** where no specialized equipment is available is to clear the airways of solid or fluid...

...10-15/min (e.g. mouth-to-mouth, or by mask), together with external cardiac **compression** at a rate of 80-100/min.
This ideally requires two trained operators. Although it...
...be performed by one trained operator, this is much less efficient due both to the **technique** itself and to the physical strain involved.
The basis for the **technique** is that the increase in **intrathoracic** pressure is transmitted to the heart; when performed properly, it has been shown to generate...

...output. This results in predominantly (min)forward(min) blood flow to the brain, as the **valves** in the great veins in the neck prevent reverse flow.
(b) (min)New(min) CPR...

...min)old(min) CPR, except that it recommends the simultaneous performance of both external cardiac **compression** and ventilation, resulting in a greatly enhanced forward blood flow and cardiac output, because of a greater increase in **intrathoracic** pressure that is transmitted in the heart. It is possible that coronary blood flow is...

...in training of a very high proportion of the community.
In order for a CPR **method** to be of use, it must be
a) Simple to understand and perform.
b) Effective...
...community setting. Five subjects (7%) stated that they would not be prepared to use this **method** while 16 (23%) would use it only selectively, according to such influences as age of...practice in many hospitals, where a variety of devices may confront a person attempting resuscitation. **Pulmonary** ventilation is frequently inadequate when these devices are used during **CPR** , unless special instruction is given, and one frequently used **system** , **bag - valve** -mask ventilation, had a 97% failure rate even after instruction (Lawrence and Sivaneswaran, op. cit...

...endotracheally or with an oesophageal obturator airway (JAMA, op. cit.).

However, most mouth-to-mask **methods** require the operator to hold the mask to the patient's face using both hands...

...operator must be present if cardiac massage is to be applied, which gravely limits this **method** . More commonly such emergencies occur in situations where face masks are not available.
Whilst U...

...person to perform simultaneously the functions of
a) cardiac massage,
b) artificial respiration, and
c) **suction** of secretions from the airway, without placing the operator in contact with the patient's...

...with an oropharyngeal airway; the bottom wall being adapted to, in use, rest on the **chest** of a patient to support the pump; said wall structure being capable of contracting and...

...through the oropharyngeal airway, and pressure applied to the top wall

is transmitted to the **chest** of the patient via the bottom wall after contraction of the wall structure to effect...

...sectional view taken along line 4-4 of Figure 3 and showing one form of **valve** arrangement for the various inlets and outlets from the pump;

Figure 5 is a cross-sectional view of the **valve** housing section of the pump of Figure 2, but with an alternative form of **valve** for the various inlets and outlets;

Figure 6 is a cross-sectional view taken along...

...The side walls 3 and 4 are of a bellows construction such as to resiliently **compress** and expand as an axial force is applied to and released from the pump. Inner...

...via a gas inlet spigot 7 through the top wall 2 and one-way flap **valve** 8. When the operator applies hand pressure to the top face 2, as indicated by the arrow to axially **compress** the side walls 3 and 4, gas is expelled from gas chamber 5 through one-way flap **valves** 9 and 10 into gas outlet tubes 11 and 12 contained within and extending outwardly ...to be extracted and sucked through a waste-venting tube 13 and a one-way **valve** 14 into the waste chamber 6. From there waste can leave via a one-way flap **valve** 15 via a waste outlet tube 16 to a waste reservoir (not shown). Expulsion of waste in this way is assisted by subsequent **compression** of the pump. The top face of the pump may carry means such as straps...

...The underside of the bottom wall 1 is adapted to, in use, rest on the **chest** of a patient to support the pump.

With reference to Figure 7, distal ends of...

...telescoping wall members with an internal spring biasing the structure to an expanded condition, and **compressible** under pressure, and expandable when pressure is removed, to function in a similar manner to ...

...sophisticated embodiment of the invention with reference to Figures 2 to 4, and its alternative **valve** arrangement as shown in Figures 5 and 6, the pump comprises a gas chamber 23...

...Figure 1, the side wall 22 is of a bellows construction such as to resiliently **compress** and expand as an axial force is applied to and released from the pump. The...

...and 22, and upper surface of interface 21 provides the gas chamber 23, and a **compression** spring 24 is positioned centrally within the gas chamber to bias the side wall 22...

...wall, with a clamping band 32 being additionally applied to consolidate the connection. A further **compression** spring 33, having a lesser spring force than the biasing spring 24 in the gas...

...to act as the bottom wall of the pump which in use, rests on the **chest** of the patient to support the pump. In use axial pressure applied to the top wall 20 of the pump initially **compresses** the wall structures of the gas and waste chambers 23 and 29 to be then transmitted through the bottom wall to the **chest** of the patient to effect simultaneous cardiac massage and ventilation.

With reference to Figures 2 **compressed** against the biasing force of the spring 24 within the gas chamber 23 and gas...

...interface 21 and into a radial gas transfer port 41, past a gas outlet

check **valve** 42 to a gas outlet passage 43 and then onto a gas outlet tube leading...

...and into a radially waste transfer passage 45, and then past a waste outlet check **valve** 46 to a waste outlet passage 47 and then onto a suitable receptacle for disposal...

...through a gas inlet passage 48 in the interface 21, past a gas inlet check **valve** 49 into a gas inlet transfer passage 50 and onto a gas inlet port 51...

...passage 52 in the interface 21, which in turn communicates, via a waste inlet check **valve** 53, with a radial waste transfer port 54 and waste inlet port 55 leading to...

...release of increased pressure through the pump body, whilst the pump is situated on the **chest** of the patient, applies external cardiac massage or **compressions** .

There is a tendency at the pharyngeal piece within the patient for gas to flow...

...the waste-venting tube and back to the waste chamber, rather than into the respiratory **system** of the patient, and in order to prevent such from happening in the embodiment of Figure 2, a conical **valve** member 55a is provided within the waste chamber 29 on the inside wall of the...

...with the waste inlet port 55, such that, when the waste housing is collapsed the **valve** member closes the port 55 and thus any bypassing of the gas back through to the waste chamber 29 is resisted ensuring that the gas therefore flows into the respiratory **system** of the patient.

Also, as shown in Figure 2, a bleed port 47a is provided...

...47, whereby, when waste is expelled through the waste outlet, and the waste outlet check **valve** 46 closes, air within the outlet can re-enter the waste chamber through the bleed port 47a to in effect release the **vacuum** , that is, raise the pressure within the waste chamber to match the outside pressure within the outlet 47.

In the embodiment of Figure 2 to 4, the check **valves** 42, 46, 49 and 53 are in the form of simple flap **valves** positioned within the respective passages and held in place at the inner ends of the...

...sleeves 56, whilst in the case of the gas and waste inlet passages, the check **valves** are captured between inner sleeves 57, at the inner end of the respective inlet passages, and outer sleeves 58, whereby the check **valves** are positioned midway along the length of those passages to ensure sufficient space for the flaps of the check **valves** to swing to an open position. Each check **valve** comprises a thin disc of semi-rigid material, with a circular slit cut around the...

...reversed flow or pressure.

In the alternative embodiment of Figures 5 and 6, the check **valves** consist of "curl-type" **valves** comprises a housing having a cylindrical wall 62, one end of which is closed by...

...the wall 63 has an aperture 68 therethrough which receives a stem 65 of a **valve** closure disc 66. A bulb 67 is formed on the free end of the stem 65 which, in the assembly of the check **valve** deforms when pushed through the aperture 68, but will prevent disengagement from within the aperture...with two outlets from the gas chamber, for example an additional identical gas outlet and **valve** arrangement on the opposite side of the waste inlet, and each communicating with its own...

...the neck extended backwards.

c) Quickly loosen or remove all clothing around the neck and **chest** .

d) Where possible, clear the patient's mouth and airway of all visible fluid or...

...operator should be kneeling by the side of the patient, leaning over the patient's **chest** and device as shown.

c) Place the bottom of the pump on to the lower...

...the flat of each hand on top of the other, parallel to the patient's **chest** and crossed at 90(degree) to each other. The fingers of each hand should be...

...i.e.

a) 1-second (min)ventilation(min), then

b) 10x1/2-second (min)cardiac **compressions** (min) then

c) 1-second (min) **suction** (min).

(1) In a single action, firm **compression** straight downwards by the movement of both hands, will collapse the unit and inflate the patient's **chest** , i.e. a 1-second action (min)ventilation(min). Maintain this downward pressure to keep...

...to allow the sternum to rise whilst still keeping the pump deflated. This (min)cardiac **compression** (min) should take 1/2 second.

(3) Repeat step (2) a total of 10 times...

...Release pressure and allow the unit to re-expand over 1 second i.e. (min) **suction** (min). (Reduced pressure below an atmosphere pressure in the pump will allow air or O...

...chamber).

(5) Repeat step (1). From now on, this manoeuvre which inflates the patient's **lungs** will also empty the waste chamber of its contents through a conduit, and away from...

...6) Repeat steps (2) to (5), and so on.

Thus, a periodic sequence of manual **compressions** will co-ordinate a (min)ventilation(min), then maintain an inflated **chest** whilst performing 10 serial (min)cardiac **compressions** (min), in accordance with the current theory of (min)New(min) CPR, which is now...

...specialized equipment is accessible which has the features of:

Providing a combination of ventilation, cardiac **compression** , and **suctioning** and the additional preferred feature of removal of airways matter.

The resuscitator according to the...

...of:

1. Applying the principles of (min)New(min) CPR i.e. simultaneous maintenance of **chest** inflation and external cardiac **compression** (with the added advantage of regular automatic **suctioning**), to enhance cardiac output.

2. Providing a correctly positioned oropharyngeal airway that is firmly held...

...CLAIMS and that the bottom wall (1,30) is adapted to, in use, rest on the **chest** of a patient to support the pump and pressure applied to the top wall (2,20) is transmitted to the **chest** of the patient via the bottom wall (1,30) after contraction of the side wall...

...said inlets (7,48, 13, 52) and outlets (11, 12, 40, 16, 44) contain check **valves** (8, 10, 14, 15) to prevent reverse flow therethrough.

24/3,K/33 (Item 33 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

01015782 **Image available**
INEXSUFFLATOR
INEXSUFFLATEUR
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(EP) AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LU MC NL PT SE SK TR
(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
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Fulltext Availability:
Detailed Description
Claims

English Abstract
A manual inexsufflator (10) including a standard mechanical ventilator (16), a medical **suction** unit (14), and a piston-like sliding **valve** mechanism (18) which connects a patient ventilation interface (12) with either the ventilator or the **suction** unit (14). By sliding the **valve** mechanism (18) in and out the user selectively connects the patient to either the ventilator (16), for purposes of insufflation, or the **suction** unit (14), for purposes of exsufflation. The ventilator (16) may generate expiratory positive airway pressure...

French Abstract
...un ventilateur mecanique classique (16), une unite d'aspiration medicale (14), et un mecanisme de **valve** (18) coulissant de type piston connectant une interface de ventilation (12) de patient soit au ventilateur soit a l'unite d'aspiration (14). Par coulissement du mecanisme de **valve** (18) a l'interieur et a l'exterieur, l'utilisateur connecte selectivement le patient soit...

Detailed Description
... from airways.

BACKGROUND OF THE INVENTION
Patients suffering from weakness of the muscles of the **thoracic** cage and
diaphragm, as may occur in, for example, Duchenne Muscular Dystrophy or Cervical Spine...

...to clear respiratory secretions from their lower respiratory tract, retained secretions may develop in their **lungs** . As retained secretions constitute a focus for infection, these patients are at high risk ... fatal, pneumonia, and are thus in need of assistance in expectorating their respiratory secretions.

Several **techniques** for assisting such patients are known. If the degree of muscle weakness is mild, physical therapy **techniques** such as "manually assisted coughing" may be effective. With this **technique** , the therapist enhances the efficacy of the patient's natural cough by means of a adequate **pulmonary** toilet.
For patients who are intubated with. an endotracheal tube, or have a permanent tracheostomy...

...which may be necessary for purposes of mechanical ventilation due to the severity of the **chest** wall muscle weakness), endotracheal **suction** is commonly used as a **technique** for secretion clearance.

Endotracheal **suction** is achieved by inserting a narrow gauge catheter into the patient's trachea via a larger gauge endotracheal tube or tracheostomy carmula, and then applying **suction** through the catheter. Secretions that are in proximity to the tip of the catheter are then sucked into the catheter and removed. This **technique** achieves secretion removal by utilizing a **suction** force to cause secretions to either adhere to the catheter tip or enter into the catheter, which is then withdrawn from the body while the **suction** force is maintained. It should be noted that the **suction** is generated within the **suction** catheter only, not within the endotracheal tube or tracheostomy cannula, and that it is executed...

...patient's respiratory cycle, be it inspiration or expiration.

There are several drawbacks to endotracheal **suction** as a means for clearing respiratory secretions. The **procedure** is invasive, thus requiring sterile **technique** for its performance, and may cause physical trauma to, or infection within, the patient's airways. Moreover, this **technique** can only be performed on those patients who are already intubated or tracheostomized, and is...

...patients, and for intubated patients who wish to avoid the above-mentioned drawbacks of endotracheal **suction** , a desirable mechanical **method** for removal of tracheobronchial secretions is that of mechanical insufflation-exsufflation (also known as inexsufflation... Fourth Edition, McGraw-Hill, 1979, defines exsufflation as "forcible expiration; forcible expulsion of air from **lungs** by a mechanical apparatus".

Most commonly, an inexsufflator is applied to a patient's respiratory...a cyclical fashion as follows: First, the inexsufflator mechanically pumps air into the patient's **lungs** until the **lungs** have expanded to their

maximum capacity (insufflation). Then, at the moment of peak insufflation, the inexsufflator rapidly sucks air out of the patient's **lungs** at a high ...an inexsufflator artificially simulates the action of a natural cough.
Thus, in contrast to endotracheal **suction** , inexsufflation is noninvasive (and thus does not require sterile **technique** or cause trauma to the airways), and achieves secretion removal by causing rapid airflow (at...have wealmess of their facial and glossopharyngeal muscles in addition to the weakness of their **chest** wall muscles, and they typically are unable to "hold in" a deep breath for a significant period of time. As such, after an inexsufflator completes the **lung**0 insufflation cycle, the insufflated air may rapidly dissipate through the patient's mouth and nose...onset of exsufflation is even marginally delayed the volume of air within the patient's **lungs** which will be available for mechanical exsufflation will be significantly diminished, resulting in an ineffective "cough".

Mechanical inexsufflation is particularly effective when it is augmented by the manual assisted cough **technique** described above. This is usually done by a single caregiver (often a physiotherapist or a member of the patient's family) who operates the inexsufflator while simultaneously applying abdominal/ **chest** thrusts timed to the exsufflation phase of the machine.

It is physiologically desirable that each...the machine. This mechanism is used to generate airflow alternately in two directions: into the **lungs** under positive pressure during insufflation, and out of the **lungs** under **negative pressure** during exsufflation. In the "automatic" version of this machine, model CA-3000, cycling from insufflation...ventilator for purposes of mechanical ventilation via an invasive or noninvasive ventilation interface, as their **chest** wall muscle weakness limits not only their ability to cough, but also their ability to...period encourages the collapse of smaller airways and alveoli, which traps secretions deep within the **lung** .

2) Standard inexsufflators are comprised of a built-in mechanism for generating airflow in two directions (both into and out-of the patient's **lungs**), which is ...3000 in 2002.

3) It is difficult for a caregiver performing the manual assisted cough **technique** simultaneously with mechanical inexsufflation to achieve optimal coordination with a manual inexsufflator. This is because...

...perform a different maneuver simultaneously: while one hand has to perform an "in-out" abdominal/ **chest** thrust on the patient, the other hand has to perform a "side-to-side" rotary...yet efficient and effective in artificially reproducing a coughing action to clear respiratory secretions from **lungs** and airways.
In general terms, the inexsufflator of the current invention may comprise three primary components: 1) a mechanical ventilator, 2) a **suction** unit, and 3) a sliding, piston-like, **valve** mechanism, which connects the above two components ...Any type of standard mechanical ventilator, including ventilators of the type used by patients with **chest** wall weakness for purposes of mechanical ventilation, may be used as part of the inexsufflator piston- **valve** and **suction** components of the current invention need be added so as to "convert" their ventilators into...

...also known as expiratory positive airway pressure, during the pause between inexsufflation cycles.

The piston- **valve** establishes airflow continuity between the patient interface and, depending on the **valve** 's orientation (i.e., piston "pushed in7' or piston "pulled ouf'), either the ventilator or the **suction** unit, both of which operate continuously. The operator of the inexsufflator causes the device to cycle between insuffiation and exsufflation by manually pulling the piston of the **valve** outward (when the ventilator is delivering a breath) and then pushing it inward (at the ...

...airflow continuity between the patient and either the mechanical ventilator (thus achieving insufflation) or the **suction** unit (thus ... has terminated, thus preventing alveolar or airway collapse

The "in-out" movement of the piston- **valve** parallels the arm action of an abdominal/ **chest** thrust as is done for purposes of assisted coughing. Thus, an operator performing an abdominal...exact coordination of the two actions by the operator, thus enhancing the efficacy of the **procedure** .

In an embodiment of the invention, an external mechanical ventilator may be used for generating...

...during the pause between insufflation-exsufflation cycles, by means of the mechanical ventilator.

The manual **valve** mechanism may be operated by an "in-out" or "push-pull" type of hand/arm...to generate an expiratory positive airway pressure and a volume-cycled mechanical ventilator, and a **valve** connected to the source of positive fluid pressure and the source of negative fluid pressure, the **valve** being adapted to selectively connect the patient interface unit with the ...negative fluid pressure. Further in accordance with a preferred embodiment of the present invention the **valve** includes a manual **valve** .

In accordance with a preferred embodiment of the present invention the manual **valve** includes a sliding element.

There is also provided in accordance with a preferred embodiment of...

...a source of negative fluid pressure, a source of positive fluid pressure, and a manual **valve** connected to the source of positive fluid pressure and the source of negative fluid pressure, the **valve** being adapted to selectively connect the patient interface unit with the source of positive fluid pressure and the source of negative fluid pressure, and the **valve** including a sliding element.

In accordance with a preferred embodiment of the present invention the...

...noninvasive ventilation interface.

In accordance with a preferred embodiment of the present invention the manual **valve** is adapted to substantially seal fluid flow from the source of positive fluid pressure to...that includes providing positive fluid pressure from the source of positive fluid pressure via the **valve** to the patient interface unit, and, within a predetermined period of time, substantially sealing fluid...

...generally simultaneously providing negative fluid pressure from the source of negative fluid pressure via the **valve** to the patient interface unit.

Still further in accordance with a preferred embodiment of the... preferred embodiment of the present invention the source of negative fluid pressure includes a medical **suction** unit.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be understood and appreciated more...negative fluid pressure may be provided, such as but not limited to, a standard medical **suction** unit, for example, an Accuvac Basic Aspirator (Gottlieb Weinnianti GmbR & Co.

Hamburg, Germany) a **vacuum** cleaner or any other suitable **suction** device. A source 16 of positive fluid pressure may be provided, such as but not limited to, a mechanical ventilator or an " **AMBU** " type **manual resuscitator bag** , for example. It is ...with any suitable control apparatus, sensors, recording devices and the like (not shown).

A manual **valve** 18 is preferably connected to the source 14 of negative fluid pressure and to the source 16 of positive fluid pressure. **Valve** 18 is adapted to selectively connect patient interface unit 12 with sources 14 or 16...

...and positive fluid pressure, respectively.

The following is one example of a construction of manual **valve** 18, although it is understood that the manual **valve** 18 is not limited to this construction. In the illustrated embodiment, manual **valve** 18 comprises a cylindrical housing 20 having a connector element 22 for connection to patient...

...at the interface between housing 20 and connector element 24 for varying the amount of **negative pressure** , i.e., controlling the amount of **suction** . Housing 20 may have an opening 27 that fluidly communicates with connector element 24. One...housing 20 (pressure sensor 28 is omitted for clarity in Figs. 2 and 3).

Manual **valve** 18 may comprise a sliding element 30 that may include a hollow cylindrical piston 32...from the source 14 of negative fluid pressure to patient interface unit 12. Thus, manual **valve** 18 may operate like a two-way **valve** .

A working cycle of inexsufflator 10 for providing air to a patient and suddenly causing...In Fig. 2, source 16 of positive fluid pressure supplies positive fluid pressure via manual **valve** 18 to patient interface unit 12, which pressure is forced into the airways and respiratory **system** of the patient. The positive pressure may be monitored by observing pressure sensor 28. In...

...to discern the onset and peak of insufflation. At or near the moment of maximal **lung** insufflation, as depicted by an increase in the pressure recorded on pressure sensor 28 or as discerned by observation of the patient's **chest** wall movement, the user initiates exsufflation as follows: Within a predetermined period of time, preferably...

...as to prevent air dissipation prior to the onset of exsufflation, the user moves manual **valve** 18 to the second orientation shown in Fig. 3. For example, the user may suddenly via manual **valve** 18 to patient interface unit 12. The sudden application of **negative pressure** to the **lungs** that have been insufflated with the positive pressure may generate a rapid airflow out of the **lungs** of the patient, thereby

achieving exsufflation. During the **process** of exsufflation, the user monitors pressure sensor 28 so as to discern the degree of **negative pressure** being generated within the patient's airways.

After a predetermined period of time, such as but not limited to about I second, or upon attainment of a desired degree of **negative pressure** within the airways, the manual **valve** may ...embodiment of the current invention, source 16 of positive fluid pressure is a hand-held " **AMBU** " type **manual resuscitator bag** , for example, an MR-100 Adult Resuscitator (Galerned Corp. Taiwan). In terms of this embodiment, the phase of insufflation is initiated by the user manually squeezing the **manual resuscitator bag** so as to generate positive pressure within the patient's airways, as depicted by pressure...LP-10 Volume Ventilator (Nellcor Puritan Bennet Inc. Pleasanton, CA) or an LTV-1000 Ventilator (**Pulmonetic Systems** , Colton, CA). A volume-cycled ventilator is a ventilator in which the amount of air...

Claim
... positive airway pressure, a volume-cycled
mechanical ventilator and a manual resuscitator; and
d) a **valve** connected to said source of positive fluid pressure and said source of negative fluid pressure, said **valve** being adapted to selectively connect said patient interface unit with said source of positive fluid...unit
comprises a noninvasive ventilation interface.

3 The inexuflator according to claim I wherein said **valve** comprises a manual
valve .

4 The inexuflator according to claim 3 wherein said manual **valve** is adapted to substantially seal fluid flow from said source of positive fluid pressure to fluid pressure via said **valve** to said patient interface unit, and, within a predetermined period of time, substantially seal fluid...

...generally simultaneously providing negative fluid pressure from said source of
negative fluid pressure via said **valve** to said patient interface unit.

6 The inexuflator according to claim I and ftirther comprising...

...and said negative fluid
pressure.

7 The inexuflator according to claim 3 wherein said manual **valve** comprises a sliding ...inexuflator according to claim I wherein said source of negative fluid
pressure comprises a medical **suction** unit.

13 An inexsufflator ...of negative fluid pressure;
c) a source of positive fluid pressure; and
d) a manual **valve** connected to said source of positive fluid pressure and said
source of negative fluid pressure, said manual **valve** being adapted to selectively connect said patient interface unit with 'said source of positive fluid pressure and said source of negative fluid pressure, and said manual **valve**
comprising a sliding element.
14 The inexsufflator according to claim 13, wherein said patient

interface manual **valve** is adapted to substantially seal fluid flow from said source of positive fluid pressure to...inexuflator according to claim 13 wherein said source of negative fluid pressure comprises a medical **suction** unit.

24/3,K/36 **(Item 36 from file: 349)**
DIALOG(R)File 349:PCT FULLTEXT

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FLOW CONTROL VALVE **FOR MANUAL RESUSCITATOR DEVICES**
VALVE **DE REGLAGE DE DEBIT POUR DISPOSITIFS DE REANIMATION MANUELS**
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FLOW CONTROL VALVE **FOR MANUAL RESUSCITATOR DEVICES**
VALVE **DE REGLAGE DE DEBIT POUR DISPOSITIFS DE REANIMATION MANUELS**
Patent Applicant/Assignee:
O-TWO **SYSTEMS** INTERNATIONAL INC...
Main International Patent Class: **A61M-016/20**
International Patent Class: **A61M-016/00**
Fulltext Availability:
Detailed Description
Claims

English Abstract
An improved **manual resuscitation** device such as a **bag - valve** -mask (BVM) device with flow control **valve** to eliminate the danger of patient distention and aspiration of stomach contents during ventilation. The...

...patient face sealing edge, flexible manually squeezed bag with a one way intake and output **valves** in flow communication with a gas source and the mask inlet, and exhaust port for exhausting exhaled gas from the mask when the bag output **valve** is closed. The flow control **valve** is interposed between the mask and bag to automatically and variably limit the rate of...

...between a predetermined minimum flow rate and a maximum flow rate. A similar flow control **valve** can be included in any manual resuscitation device such as a pocket mask or face...

French Abstract

...perfectionne, par exemple un dispositif a masque et ballon d'anesthesie (BVM), equipe d'une **valve** de reglage de debit afin d'eliminer le risque de distension du patient et d...

...patient, un sac flexible manuellement comprime pourvu d'un orifice d'aspiration unidirectionnelle et de **valves** de sortie en communication d'ecoulement avec une source de gaz et l'entree du...

...et un orifice d'echappement pour l'evacuation du gaz exhale du masque lorsque la **valve** de sortie du sac est fermee. La **valve** de reglage de debit est interposee entre le masque et le sac afin de limiter...

...par exemple un masque de poche ou un ecran facial, peut etre equipe d'une **valve** de reglage de debit de ce type.

Detailed Description

FLOW CONTROL **VALVE** FOR MANUAL RESUSCITATOR DEVICES

TECHNICAL FIELD

The invention relates to a flow control **valve** for preventing gastric distention and aspiration of stomach contents due to excessive gas flow rates...

...flow rate of pressurized air from a manually operated resuscitation device, such as a Bag- **Valve** -Mask device, pocket mask, face shield, or endotracheal tube.

BACKGROUND OF THE ART

In the relevant art of **pulmonary** resuscitation using manually operated resuscitation devices, the Bag- **Valve** -Mask resuscitator (commonly referred to as a "BW") has been the primary **method** of ventilating the patient in respiratory arrest for some 40 years. The BVM device is...

...in U.S. Patent Nos. 4,532,923 and 4,622,964 to Flynn.

Cardio- **pulmonaly** resuscitation (CPR) can be administered mouth-to-mouth without protection but recently to protect the...

...medical personnel, use of various protective manually operated devices is common. For example, one way **valves** , patient exhalation **valves** and fabric shields are fitted to pocket masks and face shields in order to inhibit...

...BVM consists of a self inflating balloon at one end having a one way intake **valve** that allows gas to be drawn into the balloon as the balloon recoils after it has been manually squeezed by the user. The intake **valve** self seals when the inflated bag is squeezed, and opens when the bag is permitted to recoil naturally. On the other end of the balloon, a one way output **valve** permits the gas to leave the bag when squeezed 1 0 directing the flow of gas to the patient through a facemask, or other airway adjunct.

The output **valve** opens when the inflated bag is squeezed, and self seals when the bag is permitted to recoil naturally. The output **valve** when sealed diverts the exhausted gas from the patient out through an expiratory port on the **valve** housing. As a result of cyclical manual squeezing and recoil of the balloon, gas is...

...October 1986;15:1187-1192; Stone B.J. et al, The Incidence of Regurgitation During **Cardiopulmonary** Resuscitation : 4 Comparison Between the **Bag Valve** Mask and

2
Laryngeal Mask Airway Resuscitation 38 (1998) 3-6; Elling, B.A. et...
...Ventilation, Am. J. Emerg. Med. 1988;6:333-336; Manoranian, C.S. et al, Bag- **Valve** -Mask Ventilation; Two Rescuers Are Better Than One: Preliminary Report, Critical Care Medicine, 1985;13:122-123; Lande, S. et al, Comparing Ventilatory **Techniques** During CPR, J.E.M.S. May 1982; Harrison, R.R. et al, Mouth-to-Mouth Ventilaion: A Superior **Method** ofRescue Breathing, Ann. Emerg. Med., 11:74776, February 1982].

Additionally, the requirements of ventilation have...

...care situations that tend to reduce the attention and level of care directed to ventilation **techniques** .

While normal breathing requires muscle action (diaphragm, intercostals and others) to
3
produce a **negative** **pressure** (subatmospheric or **vacuum**) within the **chest** to draw air into the **lungs** , artificial ventilation is accomplished by forcing air or oxygen into the **lungs** under an external positive pressure.

The positive pressure required to deliver a set volume (tidal...
...a patient is dependent on two factors: (1) the compliance, stiffness or elasticity of the **lung** , and (2) the resistance to gas flow within the conducting airways. For example, a 11stiff' **lung** that is damaged by **pulmonary** fibrosis, disease or trauma requires a higher pressure to deliver a set tidal volume than a normal elastic **lung** . Similarly, gas will encounter less resistance through a normal airway that is not narrowed by bronchospasm or asthma, kinked by a poor airway opening **technique** , or plugged with blood, mucous, vomit or other debris.

As a result, manual and automatic ventilation **techniques** must accommodate a range of pressures. With a common tidal volume of gas that is delivered, the patient's **lung** and airway condition will determine the pressure needed to ventilate the patient.

However, there is a safe upper limit to the pressures that can be used to prevent **lung** damage. The danger of pneumothorax or **lung** rupture due to excessive pressures is considered to occur between 75 and 85 cmH20Regarding the...

...200 litres/minute at pressures of 100
4
cmH20 are commonly delivered when fully trained **emergency** **medical** personnel use the manual ventilating **techniques** involving **Bag - Valve** -Masks and mouth-to-mouth resuscitation, with patient isolating **valves** on pocket masks and face shields.

The problem in the emergency medical service field is...

...that they are competent in using the manual devices and that the manual devices and **methods** themselves are efficacious. Many technicians claim that the manual "feel" of the BVM allows them to make clinical judgements on the patient's **lung** condition. In reality what they are feeling is the backpressure created by the high flow...

...reality during literally life and death situations the operators are constantly
5

preoccupied. The bag- **valve** -mask requires almost continuous contact with one hand of the user and thereby imposes extreme...

...722,394 to Loescher shows an example of a BVM including a high pressure exhaust **valve** . U.S. Patent No. 5,537,998 to Bauman provides a spring loaded piston which...
...the invention below.

6
DISCLOSURE OF THE INVENTION
The invention relates to an improved bag- **valve** -mask (BVM) device with flow control **valve** to eliminate the danger of patient distension and aspiration of stomach contents during ...patient face sealing edge, flexible manually squeezed bag with a one way intake and output **valves** in flow communication with a gas source and the mask inlet, and exhaust port for exhausting exhaled gas from the mask when the bag output **valve** is closed. The flow control **valve** is interposed between the mask and bag to automatically and variably limit the rate of...

...with reference to the
accompanying drawing wherein.

Figure I is a view of a Bag- **Valve** -Mask where a patient ventilated by the
operator and the gas flow is controlled with a flow control **valve** located in a modified neck bushing disposed between the bag and the mask, the flow control **valve** having a frusto-conical **valve** plug slidably biased to the right and moved to the left to restrict the gas flow through the **valve** in response to gas flow impinging on the upstream surface of the **valve** plug.

Figure 2 is a longitudinal section view through the flow control **valve** with sliding **valve** stem, spring loaded frusto-conical piston and frusto-conical inlet chamber serving as a **valve** seat.

7
Figure 3 is a perspective view of a face shield with a flow control **valve** in accordance with a second embodiment of the invention disposed within the tube extending through...

...sheet.

Figure 4 is a perspective view of a face shield with a flow control **valve** in accordance with a third embodiment of the invention disposed within the tube extending through...

...DESCRIPTION OF PREFERRED EMBODIMENTS
Figure 1 shows the general arrangement and use of a bag- **valve** -mask device I also known as a BVM. The invention centres on a simple but valuable modification to the conventional BVM by insertion of a flow control **valve** 7 between the patient mask 2 and the bag 3. Details of one embodiment of flow control **valve** 7 are shown in Figure 2.

1 5
A similar flow control **valve** 7 can be included in any manual resuscitation device such as a pocket mask 23...

...squeezes and releases the flexible bag 3 to pump gas through a one way intake **valve** 4 from a breathable gas source, through a one way output **valve** 6 in flow communication with the mask 2. Exhaust ports 5 exhaust

exhaled gas from the mask 2 when the bag output **valve** 6 is closed.

The flow control **valve** 7 is disposed in flow communication between the mask 2 and
8
bag 3 for...

...the bag 3 is deflated to the same degree for each breath. The flow control **valve** 7 controls the rate or speed (for example in units of ~~litres per minute) of...~~

...size hands, varying strength, varying skill etc.
As shown in Figure 2, the flow control **valve** 7 includes a housing 8 with control **valve** inlet 9, control **valve** outlet 10 and an orifice 12 therebetween. Gas flow sensor surface 14 senses the impingement of gas flowing from with the **valve** inlet 9 and the resultant sliding of the **valve** plug I I against the bias of spring 18 serves to automatically restrict gas flow...

...the plug I 1. Other means to sense the gas flow besides a spring loaded **valve** plug 1 1 can be provided but at higher cost than the simple device illustrated such as: a flexible diaphragm; pneumatic pressure sensing **valves** ; rotating flow meter propellers; and electrical gas flow sensors.

As shown in Figure 2 a...

...inexpensive means to automatically variably restrict the orifice 12 can be constructed using a conical **valve** seat 12 and movable conical **valve** plug 1 1 with a gas flow impingement surface 14 and a **valve** seat mating surface 22. The plug 1 1 is normally biased away from the **valve** seat 12 by the spring 18 and is urged toward the **valve** seat 12 by gas flow against the flow impingement surface 14.

To mount the plug 1 1 within the housing 8 a bulkhead 14 is included downstream of the **valve** seat 12. The bulkhead 14 includes perforations 16 that can be sized to ensure that at all times a minimum gas flow is permitted to pass through the **valve** 7 when the plug 1 1 is moved to it's farthest point. The spring and motion limiter 21 serve to prevent complete closure of the gas flow control **valve** and always permit a
9
minimum gas flow to pass through.

The plug 1 1 is mounted to an upstream end of a **valve** stem 13 and the **valve** stem 13 is slidably mounted within a through bore 17 in the bulkhead 14 with the spring 18 disposed about the **valve** stem 13 between the plug 14 and bulkhead 14. The **valve** stem 13 preferably includes a retainer 19 downstream of the bulkhead 14 for preventing removal...

...surface 20, as does the motion limiter 21. Both surfaces 20 are disposed on the **valve** stem 13 a selected distance from the bulkhead 14 for limiting the range that the stem 13 can slide within the bore 17. The **valve** stem 13 and bulkhead bore 17 preferably have a clearance space disposed therebetween sufficient to allow lateral motion of the **valve** plug I 1 relative to the **valve** seat 12. Such clearance not only ensures that the stem 13 will not unintentionally bind...
...also allows the plug I 1 to be self-centring and prevent binding of the **valve** seat 12 and plug surface 22.

1 5
With regard to the second embodiment shown in Figure 2, the same flow

control **valve** 7 is adapted to use with a face shield 24. The face shield 24 has...

...contamination. Since conventional face shields include a tube 26 usually with a one-way intake **valve** (not shown) and patient exhalation **valve** (not shown), the invention may be easily adopted for use with a face shield 24 by including the flow control **valve** 7 housed within the tube 26.

With regard to the third embodiment shown in Figure 3, the same flow control **valve** 7 is adapted to use with a pocket mask 23. The pocket mask 24 has...

...loss. Since conventional pocket masks include a tube 31 usually with a one-way intake **valve** (not shown) and patient exhalation **valve** 33, the invention may be easily adopted for use with a pocket mask 23 by including the flow control **valve** 7 housed within the tube 3 1. Further embodiments not illustrated include positioning the flow control **valve** 7 within a manually ventilated endotracheal tube that is inserted directly into the patient's...

...operator mouthpiece on the protruding end into which the operator breathes or attaches a bag- **valve** -mask device to ventilate the 1 0 patient. The use of any manually operated ventilation device can be improved by controlling the gas flow rate with a flow control **valve** as described herein.

Although the above description and accompanying drawings relate to a specific preferred...

Claim

... from the gas inlet to the patient airway, the interface having a one way intake **valve** downstream of the gas inlet; and flow control means disposed in flow communication between the...

...claim 1 wherein the patient interface is selected from the group consisting of. a bag- **valve** -mask device; a pocket mask device wherein the patient interface comprises a patient mask with...

...patient mouthpiece. 3 . A manually operated resuscitation device according to claim 2 wherein said
bag- **valve** -mask device comprises:
a patient mask having a gas inlet and a patient face sealing edge;
a flexible bag having a one way intake **valve** in flow communication with a gas source and a one way output **valve** in flow communication with the mask inlet;
exhaust port means in flow communication with the patient mask for exhausting exhaled gas from the mask when the bag output **valve** is closed; and
said flow control means disposed in flow communication between the mask and...

...device according to claim 1 wherein the
12
flow control means comprise:
a flow control **valve** housing with control **valve** inlet, control **valve** outlet and
an orifice therebetween;
a gas flow sensor in flow communication with the **valve** inlet; and
orifice restriction means controlled by the gas flow sensor for automatically restricting gas...

...gas 1 0 flow sensor is selected from the group consisting of- a spring loaded **valve** plug; a flexible diaphragm; pneumatic pressure sensing **valves** ; rotating flow meter propellers; and electrical gas flow sensors.

6 A manually operated resuscitation device according to claim 4 wherein the orifice restriction means comprise a **valve** seat and movable **valve** plug.

7 A manually operated resuscitation device according to claim 6 wherein the plug includes a gas flow impingement surface and a **valve** seat mating surface, the plug being biased away from the **valve** seat and urged toward the **valve** seat by gas flow against the flow impingement surface.

8 A bag- **valve** -mask device according to claim 6 wherein the housing includes a bulkhead downstream of the **valve** seat, the bulkhead including at least one perforation; and wherein the plug is mounted to an upstream end of a **valve** stem, the **valve** stem is slidably mounted within a through bore in the bulkhead with a spring disposed about the **valve** stem between the plug and bulkhead.

9 A bag- **valve** -mask device according to claim 8 wherein the **valve** stem includes a retainer means downstream of the bulkhead for preventing removal of the stem from the bore.
1 3
. A bag- **valve** -mask device according to claim 9 wherein the retainer means comprise a shoulder with bulkhead abutting surface.

11 A bag- **valve** -mask device according to claim 8 wherein the **valve** stein
includes a motion limiting means disposed on the **valve** stem a selected distance from the bulkhead for limiting the range that the stem can slide within the bore.
12 A bag- **valve** -mask device according to claim 1 1 wherein the motion limiting means comprise a shoulder with bulkhead abutting surface.
I 0

13 A bag- **valve** -mask device according to claim 7 wherein the **valve** seat and **valve** seat mating surface are conical surfaces.

14 A bag- **valve** -mask device according to claim 8 wherein **valve** stem'and
1 5 bulkhead bore have a clearance space disposed therebetween sufficient to allow lateral motion of the **valve**0 plug relative to the **valve** seat.
14

24/3,K/40 (Item 40 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
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00556688 **Image available**
CARDIOPULMONARY RESUSCITATION VENTILATOR AND METHODS
VENTILATEUR ET PROCEDES DE REANIMATION CARDIO- PULMONAIRE
Patent Applicant/Assignee:
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Inventor(s):
LURIE Keith G,
ZIELINSKI Todd M,
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CARDIOPULMONARY RESUSCITATION VENTILATOR AND METHODS
VENTILATEUR ET PROCEDES DE REANIMATION CARDIO- PULMONAIRE
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Fulltext Availability:
Detailed Description
Claims

English Abstract
The invention provides **systems** , and **methods** for ventilating a patient in association with cardiopulmonary resuscitation **procedures** . In one exemplary embodiment, a **system** (10) comprises a ventilator (12) to periodically supply respiratory gases to a patient's **lungs** . A sensor (14) is provided to detect **chest compressions** by sensing changes in **intrathoracid** pressure. A controller (38) is coupled to the sensor, and controls actuation of the ventilator after a predetermined number of **chest compressions** have been detected by the sensor.

French Abstract
...et des procedes de ventilation d'un patient associes a des interventions de reanimation cardio- **pulmonaire** . Dans une forme de realisation exemplaire, un **systeme** (10) comprend un ventilateur (12) qui approvisionne periodiquement les poumons du patient en gaz d'inhalation. Un capteur (14) detecte les **compressions thoraciques** par les variations de la pression **intrathoracique** . Un controleur (38) est couple au capteur et commande le declenchement du ventilateur apres qu'un nombre preetabli de **compressions thoraciques** ait ete detecte par le capteur.

Detailed Description
CARDIOPULMONARY RESUSCITATION VENTILATOR AND
METHODS
BACKGROUND OF THE INVENTION
1. Field of.the Invention
The:present invention relates generally to the field of cardiopulmonary resuscitation. In particular, the invention relates to devices and **methods** for ventilating a

patient in association with cardiopulmonary resuscitation **procedures** . WO 00/20061 PCTIUS99/23233
2
periodic ventilation of the patient. This is commonly accomplished by mouth-to-mouth **technique** or by using positive pressure devices, such as a self-inflating bag which relies on...

...s endotracheal tube or other artificial airway. In order to increase cardiopulmonary circulation induced by **chest compression** , a **technique** referred to as active **compression - decompression** @(ACD) has been developed.

According to ACD **techniques** , the active **compression** phase of traditional CPR is enhanced by pressing an applicator body against the patient's **chest** to **compress** the **chest** . Such an applicator body is able to distribute and apply force substantially evenly over a portion of the patient's **chest** .

More importantly, however, the applicator body is sealed is against the patient's **chest** so that it may be lifted to actively expand the patient's **chest** during the **decompression** step. The resultant negative **intrathoracic** pressure induces venous blood to flow into the heart and **lungs** from the peripheral venous vasculature of the patient.

other **techniques** for increasing cardiopulmonary circulation while performing CPR include impeding airflow into the patient's **lungs** during **decompression** of the patient's **chest** . Such **techniques** are described in U.S. Patent Nos. S,551,420 and S,692,498, and...

...references are herein incorporated by reference. In one particular embodiment, airflow into the patient's **chest** is impeded by placing a pressure-responsive **valve** in the patient's airway. The **valve** prevents the flow of air into the patient's **lungs** during the **decompression** phase until a threshold negative **intrathoracic** pressure is reached. At this point, the **valve** opens to allow airflow to the patient's **lungs** . Hence, when the **valve** is closed, the amount of negative **intrathoracic** pressure is increased, thereby 3S enhancing the amount of venous blood flow to the heart and **lungs** .

When performing CPR, there is a need to periodically ventilate the patient. Some common **techniques** include mouth to-mouth ventilation, ventilatory bags, and ventilation machines. However, as of yet there has been no effective and convenient way to coordinate the timing of ventilation with the **chest compressions** . For example, if mouth-to-mouth resuscitation is provided, the rescuer must count each **chest compression** , stop **chest compressions** when a predetermined number of **chest compressions** have been performed, manually ventilate the patient with the rescuer's mouth, and then return to performing **chest compressions** . Similar problems are experienced when using ventilatory bags. Moreover, with many manual ventilation **techniques** , it is difficult, if not impossible, to precisely control the timing and volume of air delivered to the patient.

Hence, it would be desirable to provide **methods** and is devices for ventilating a patient in association-with cardiopulmonary resuscitation **procedures** . It would be particularly desirable to provide a way to easily and conveniently coordinate the timing of **chest compressions** with ventilation. It would be further desirable to precisely control the volume of respiratory gases...

...Patent 1@os. 5,551,420 and 5,692,498, previously incorporated by reference describe. **techniques** for preventing airflow to the patient's **lungs** during the **decompression** phase of CPR.

ACD-CPR **techniques** are described in detail in Todd J. Cohen et al-., Active **Compression - Decompression** Resuscitation: A Novel **Method** of Cardiopulmonary Resuscitation, American Heart Journal, Vol. 124, No. 5, pp.

1145-1150, November 1992; and Todd J. Cohen et al., Active **Compression - Decompression** : A New **Method** of Cardiopulmonary Resuscitation, The Journal of the American Medical Association, Vol. 267, No. 21, June 3, 1992. These references are hereby incorporated by reference.

The use of a **vacuum** -type cup for actively **compressing** and **decompressing** a patient's **chest** during ACD- **CPR** is described in a brochure of **AMBU** International A/S, Copenhagen, Denmark, entitled'Directions for Use of AMBUO CardioPump', published in September...

...These references are hereby incorporated by reference.

SUMMARY OF THE INVENTION

The invention provides exemplary **systems** and **methods** for ventilating a patient in association with cardiopulmonary resuscitation **procedures** . In-one exemplary embodiment, a ventilation **system** comprises a ventilator to periodically supply respiratory gases to a patient's **lungs** and a sensor-to is detect **chest compressions** . A controller is coupled to the sensor and controls actuation of the ventilator after a predetermined number of **chest compressions** have been detected by the sensor. Hence, such a **system** provides a convenient and easy way to coordinate ventilation with **chest compressions** by simply sensing when the patient's **chest** has been **compressed** and periodically ventilating the patient after a predetermined number of **chest compressions** have been detected. Preferably, the controller is configured to actuate the ventilator to supply respiratory gases to the patient once about every 2 to about 10 **chest compressions** , with adults typically-receiving about one ventilation for about every 5 **chest compressions** .

The invention includes various ways to detect when the patient's **chest** has been **compressed** . For example, in one particularly preferable aspect, the **system** includes a **valve** which is placed in the patient's air way. The sensor is disposed so as to be able to detect the flow of respiratory gases through the **valve** upon **compression** of the **chest** . In this manner, an easy way is :provided to detect **chest compressions** simply by sensing the flow of respiratory gases

through the **valve** . In one particular aspect, the sensor comprises a strain gauge that is strained as respiratory gases flow through the **valve** , and a resistance sensing circuit to sense a change in resistance of the strain gauge when strained. Such a sensor is particularly advantageous when the **valve** includes a diaphragm, such as the diaphragms provided in the threshold negative **intrathoracic** pressure **valves** described in U.S. Patent Nos. 5,551,420 and 5,692,498, previously incorporated...

...the diaphragm moves due to gases exiting the patient, the strain gauge is strained.

other **techniques** for detecting **chest compressions** include sensing **intrathoracic** pressure changes in the patient's airway, sensing when an external force has been applied to the patient's **chest** , such as with a load cell or strain gauge positioned on the patient's **chest** , by sensing an impedance change in the **chest** wall, and the like. Sensors that may be employed to detect such parameters include pressure...

...spirometers, thermistors, pneumotachometers, capacitative sensors, and the like.

During at least a portion of the **decompression** phase, respiratory gases are preferably prevented from entering into the patient's **lungs** . An occlusion mechanism is preferably employed to occlude the patient's airway during the desired portion of the **decompression** phase. The occlusion mechanism may be adjustable so that it will open at a pre-set pressure level. In.this way, when a threshold negative **intrathoracic** pressure level is reached or exceeded during **decompression** , the occlu sion mechanism is actuated to allow respiratory gases to enter into the patient's **lungs** .

Actuation of the occlusion mechanism may be directly caused by the negative **intrathoracic** pressure within the patient, such as with a threshold **valve** as described in U.S. Patent Nos. 5,551,420 and 5,692,498, may...

...s airway, or may be actuated by the controller at delayed time intervals after a **chest compression** has been sensed. In the event that a sensor detects that spontaneous breathing has occurred...

...the occlusion mechanism so that respiratory gases are free to flow to the patient's **lungs** . other exemplary occlusion mechanisms that may be employed by the invention include airways that are closed using a rotary cam wheel, using a linear actuator with a **compression** member or a pair of caliper arms, and the like.

In one particular aspect, **chest compressions** are performed manually. Alternatively, **chest compressions** may be performed using an automated **compression** mechanism, such as the one described in U.S. Patent No. 4,397,306, the...

...of which is herein incorporated by reference.

In another particular aspect, the ventilator comprises a **compressible** member, such as a bag, and a **compression** mechanism to **compress** the member. Alternatively,, a cylinder with a piston may be employed. In this way, the...

...gases supplied to the patient may be is precisely controlled by controlling the amount of **compression** of the member or the size of the cylinder and the stroke of the piston...

...timing circuit that may be employed to regularly actuate the ventilator during times when regular **chest compressions** are not being performed. In this way, the patient may be ventilated once CPR is stopped. In still another aspect, the **system** further includes a power supply to supply power to the controller and the ventilator. In this way, the **system** may be configured to be portable so as to facilitate its use in emergency **procedures** .

In yet another aspect, the **system** includes at least one feedback sensor that is coupled to the controller. The feedback sensor...

...the sensor may comprise an oxygen sensor, a carbon dioxide sensor, a temperature sensor, a **chest compression** force sensor, a depth of **chest compression** sensor, a **chest compression** pressure sensor, a pH sensor, and the like. Optionally, actuation or timing of the ventilator...

...on the state of the various physiological parameters.

In still yet another exemplary aspect, the **system** includes a control panel having a mode control to change the operational mode of the ventilator. As one example, the mode control may include a **compression** detect mode where the ventilator is actuated after a predetermined number of **chest compressions** have been detected by the sensor. The mode control may also include a manual ventilation...

...as previously described so that the patient may be ventilated at regularly timed intervals when **chest compressions** are not being performed.
The control panel may also include a threshold **compression** control which is used to vary the sensitivity level of the sensor. The control panel...

...of respiratory gases supplied to the patient. Optionally, the control panel may further include a **compression** counter.

display which displays the number of detected **chest compressions** . A **compression** detector display may also be p@rovided-to display when each **chest compression** has been detected. Still further, the control panel may include a ventilation indicator to indicate...

...The control panel may also indicate the amount of pressure or force applied to the **chest** . This may be accomplished by displaying a number or a waveform demonstrating changes in **compression** , force, or pressure over time.

In another exemplary embodiment, the invention provides a **method** for performing cardio- **pulmonary** resuscitation. According to the **method** , a patient's **chest** is repeatedly **compressed** . Each **chest** **compression** is detected using a sensor which is coupled to a controller. The patient is periodically ventilated after a predetermined number of **chest** **compressions** have been detected. In this way, the timing of patient ventilation may be coordinated with the number of **chest** **compressions** by sensing changes in **intrathoracic** pressure that are caused by **chest** **compression** .

Detection of **chest** **compressions** may be performed in a variety of ways. For example, **chest** **compressions** may be ,detected by sensing changes in **intrathoracic** pressure, by sensing air flowing through the patient's airway, by sensing when an external force is applied to the patient's **chest** , by sensing impedance changes in the **chest** wall, and the like. In one particular aspect, the change in **intrathoracic** pressure is sensed by placing a **valve** in the patient's airway and sensing when respiratory gases flow through the **valve** .

In one particular aspect, respiratory gases are prevented from flowing to the **lungs** with the **valve** until a threshold negative **intrathoracic** pressure is exceeded, at which time the **valve** opens to allow the respiratory gases to flow to the **lungs** . In another alternative, respiratory gases are prevented from flowing to the **lungs** using other occlusion mechanisms which operate based on signals received from the controller. In this...

...the occlusion mechanisms when it is desired to allow respiratory gases to flow to the **lungs** .

In another aspect, a **compressible** bag is mechanically **compressed** to ventilate the patient. The bag may be automatically **compressed** after a predetermined number of **chest** **compressions** have been detected, or may be manually actuated by the rescuer. In one aspect, **compression** of the patient's **chest** is stopped after cardiac function has been restored, and the patient is ventilated at regular intervals.

In still yet another aspect, at least one physiologic parameter is sensed while performing **chest** **compressions** . Such parameters may include, for example, oxygen, carbon dioxide, temperature, pH, and the like. The...
...one or more of these parameters. Conveniently, a visual signal may be produced when each **chest** **compression** has been detected. In another option, the number of **chest** **compressions** may be counted and displayed for viewing by the rescuer. Also, an indicator may be...

...ventilated.

In yet another embodiment, the invention provides an exemplary ventilation device which comprises a **compressible** bag and a mechanical **compression** mechanism which may be operated to **compress** the bag. A coupling member is attached to the bag to couple the bag to a patient-.,I.s airway.

In one particular aspect, the mechanical **compression** mechanism comprises a plunger having a rack, a stepping motor, and a pinion coupled to a motor to move the rack.

Alternatively, the **compression** mechanism may comprise a plunger and a **compressed** air cylinder to move the plunger. Preferably, a threshold **valve** is disposed in the coupling member and is configured to open when experiencing a threshold negative **intrathoracic** pressure.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig.'1 is a schematic view of an exemplary ventilator which is coupled to a **valve** having a sensor to detect **chest compressions** by sensing changes in **intrathoracic** pressure according to the invention.

Fig. 2 illustrates an exploded view of the **valve** of Fig, 1.

Fig. 2A illustrates a diaphragm of the **valve** of Fig.

2 without expiratory pressure being applied.

Fig. 2B illustrates the diaphragm of Fig...

...1 showing a rack and pinion that is employed to move a plunger against a **compressible** bag to deliver inspiratory gases through the **valve** according to the invention.

Fig. 3A illustrates the ventilator of Fig. 1 having an air cylinder and plunger to **compress** the **compressible** bag according to the invention.

Fig. 4A is a side view of the ventilator of Fig. 1 illustrating a circuit board and motor or air cylinder access compartment and a **compressible** bag detach compartment.

Fig. 4B is a front view of the ventilator of Fig. 1...

...the ventilator of Fig. 1.
10, Fig. 7 is a schematic diagram of an alternative **system** for detecting **chest compressions** according to the invention.

Fig. 8A illustrates a rotary cam wheel airway occlusion mechanism according...

...to close an airway lumen.

DETAILED DESCRIPTION OF THE SPECIFIC EMBODIMENTS

The invention provides exemplary **systems** and **methods** for ventilating a patient in association with cardiopulmonary

resuscitation **procedures** . In a broad sense, the invention provides.for the coordination of patient ventilation with **chest compressions** . Such coordination is preferably accomplished by sensing each time the **chest** is **compressed** and counting the number of **compressions** . After a predetermined number of **compressions** have been performed, a ventilator is actuated to ventilate the patient. Preferably, **chest compressions** are sensed by detecting a change in **intrathoracic** pressure while performing CPR. Each time the patient's **chest** is **compressed** , the **intrathoracic** pressure in the patient significantly increases. Such an increase may be detected and related to a **chest compression** .

In one particularly preferable aspect, the change in **intrathoracic** pressure is sensed by detecting the flow of respiratory gases from the patient's **lungs** during **chest compressions** . one particularly preferable way to detect when respiratory gases exit the patient's **lungs** is by placing a **valve** in the patient's airway and detecting the flow of respiratory gases through the **valve** . As one example, the **valve** may comprise a threshold **valve** having a diaphragm which opens when respiratory gases exit the patient's **lungs** as described generally in U.S. Patent Nos. 5,551,420 and 5,692,498...

...a strain gauge, pressure sensor, optical sensor, or the like, may be disposed in the **valve** to detect when the diaphragm opens. Information from the sensor is then employed to count the number of **chest compressions** . Another sensor that may be employed to detect a change in **intrathoracic** pressure is a pressure sensor that is disposed in the patient's airway. other sensors that may be employed to detect when the **chest** has been **compressed** include sensors which directly detect when an external force is applied to the **chest** . For example, a **compression** pad which is placed on the patient's **chest** may include a sensor, such as a strain gauge or a load cell, which generates a signal each time the pad is **compressed** . These signals are sent to the controller to actuate the ventilator. As another example, the **compression** pad may be filled with fluid'. A pressure transducer may then be employed to detect when the pad has been **compressed** . As another alternative, a change in impedance of the **chest** wall may be sensed to indicate that the **chest** has been **compressed** .

The ventilators of the invention are preferably configured to supply a precise amount of respiratory gases to the patient's **lungs** during each delivery. In one particularly preferable embodiment, the proper volume of respiratory gases are produced by **compressing** a **compressible** bag by a known amount. For example, a plunger may be moved against the **compressible** bag by a known distance to produce a precise amount of respiratory gases.

In another...

...determined by a controlled preset rate. This mechanism is advantageous to accommodate changes in patient **lung** compliance and decrease the overall work of ventilation during CPR.

In another particularly preferable embodiment...

...be transported to any given location where medical assistance is needed. In some cases, the **compressible** bag may be configured to be removed from the ventilator so that manual ventilation may...

...it is desirable to have the ventilator actuated once about every 2 to about 10 **chest compressions** to properly ventilate the patient. Once cardiac function has been restored, the ventilator may be...

...coupled to various other sensors to monitor various physiologic parameters of the patient during the **procedure** .

For example, such sensors may include oxygen sensors, carbon dioxide sensors, temperature sensors, **chest compression** force sensors, depth of **chest compression** sensors, **chest compression** pressure sensors, pH sensors and the like.

Referring now to Fig. 1, an exemplary embodiment of a ventilation **system** 10 will be described. **System** 10 includes a ventilator 12 which is coupled to a pressure responsive **valve system** 14 by a tube 16. Although not shown, it will be appreciated that **valve system** 14 will be attached to ...by the invention include facial masks, endotracheal tubes, laryngeal mask airways, and the like.

Exemplary **valve systems** that may be employed include those described in U.S. Patent Nos. 5,541,420 and 5,692,498, previously incorporated by reference. However, it will be appreciated that other **valves** may be employed with ventilator 12. As described in greater detail hereinafter, **valve system** 14 includes a sensor to detect changes in **intrathoracic** pressure, and more particularly to detect when respiratory gases exit the patient's **lungs** . This information is transferred to ventilator 12 which counts the number of **chest compressions** and automatically supplies respiratory gases to the patient after a predetermined number of **chest compressions** have been counted.

Referring now to Fig. 2, construction of pressure responsive **valve system** 14 will be described in greater detail. **Valve system** 14 comprises a housing 18 having an inlet end 20 and an outlet end 22. A flow control **valve** 24 is disposed in housing 18 to control the flow of air or respiratory gases...

...gases through housing 18 is as follows. When respiratory gases are forced from patient's **lungs** , the respiratory gases are free to flow through outlet end 22, through housing 18 and...

...diaphragm 28 is lifted to allow the respiratory gases to flow through outlet end 22.

Valve system 14 further includes a pressure responsive **valve** (not shown) within a side intake 32. To

increase the magnitude and extent of negative **intrathoracic** pressure within the patient during the **decompression** phase of CPR, the pressure responsive **valve** within side intake 32 is configured to open only after a threshold negative **intrathoracic** pressure level is exceeded. In this way, respiratory gases are prevented from flowing through housing 18 by diaphragm 28 during the **decompression** phase. Hence, the only way for respiratory gases to enter into the patient's **lungs** (if ventilations are not provided) is through the pressure responsive **valve** inside intake 32 similar to the embodiments described in U.S. Patent No. 5,692...

...previously incorporated by reference.

In the event that the patient begins spontaneous breathing, flow control **valve** 24 may be turned 90 degrees clockwise to align arrow 26 with a second side...

...such a change in resistance may be detected and used as an indicator that the **intrathoracic** pressure within the patient's **chest** has changed. In turn, such information may be used as an indicator that a **chest** **compression** has occurred. The construction of such strain gauges is well known within the art, and...

...34 in combination with a Wheatstone-bridge is particularly advantageous in that the sensitivity of **system** 10 may be precisely controlled to accommodate patients having a variety of **thoracic** morphologies. Although the sensor that is employed to'detect airflow through housing 18 is a...
...42 is provided to facilitate transport of ventilator 12.

Disposed in housing 36 is a **compressible** bag 44 which is coupled at one end to a pair of input ports 46 and 48, which are employed to supply various respiratory gases to **compressible** bag 44. Merely by way of example, input port 46 may be coupled to an...

...input port 48 is coupled to an oxygen source. Coupled to the other end of **compressible** bag 44 is an output port So through which inspiratory gases are supplied to the...

...50 is coupled to tube 16. Ventilator includes a plunger 52 which is employed to **compress** bag 44.

Plunger 52 is moved up and down by stepping-motor 54 which is...pinion 56 in a clockwise direction to move plunger 52 downward until bag 44 is **compressed** . After **compression** , stepping motor 54 is reversed causing source pinion 56 to rotate in a counterclockwise direction...
...lifting plunger 52.. Hence, by coupling plunger 52 to stepping motor 54, the amount of **compression** of bag 44 may be precisely controlled. In this way, a precise volume of respiratory...

...and an outlet port 70. Ports 68 and 70 are in turn coupled to a **compressed** air tank 72. When inlet port 68 is opened and outlet port 70 is closed, **compressed** air from tank 72 moves

plunger 52 downward to **compress** bag 44. To lift plunger 52, inl et port 68 is closed and outlet port...

...that is delivered to the patient. A variety of other mechanisms may be employed to **compress** bag 44 including caliper arms, cams, and the like. Further, it will be appreciated'that...

...12 will operate from power supplied by the NiCd battery.

One important feature of ventilation **system** 10 is that the rechargeable battery may be recharged when not in use simply by...

...the "off" position. This allows the rechargeable battery to be charged and fully functional for **remote** emergency operations.

Housing 36 is preferably constructed of a durable non-metallic material that is...

...preferable waterproof and noncorrosive to enable to withstand various regional climates. In this way, ventilation **system** 10 will be useful in a wide variety of locations where emergency operations may be performed.

As best shown in Fig. 4A, ventilator 12 includes a **compressible** bag compartment 80 and a circuit board and motor drive compartment 82. Doors 84 and...

...to allow access into compa rtments 80 and 82, respectively. As shown in Fig. 4A, **compressible** bag 44 is detachable from ports 46, 48 and 50 (see Fig. 1). In this way, bag 44 may be removed from ventilator 12 and used manually in connection with **valve system** 14. Such an arrangement may be useful during situations where ventilation **system** 10 is used **remotely** and the rechargeable battery has been depleted. In such a case, bag 44 is simply removed from compartment 80 and attached to **valve system** 14 which in turn is coupled to the patient's air way. Bag 44 is...

...position. When in the "on" position, electrical power is supplied to the various components of **system** 10. Control panel 38 further includes a mode control 88 which may be moved between three positions to place ventilation **system** 10 in a manual mode, a **compression** detection mode or an automatic mode. When in the manual mode, a user may manually...

...supplied to the patient through inspiratory gas port 50 (see Fig. 4A).

When in the **compression** detect mode, ventilation **system** 10 is configured to automatically detect and count the number of **chest compressions** . Ventilator 12 then automatically ventilates the patient through inspiratory gas port 50 at a preselected **compression** to ventilation ratio. This ratio may be adjusted by moving a **compression** /ventilation control 92. By way of example, **compression** /ventilation

control 92 may be ...has been restored
but the patient still requires ventilation.

Control panel 38 further includes a **compression** threshold control 96 which may be adjusted to adjust the sensitivity of the strain gauge...

...previously described. In this way, the sensitivity may be adjUsted to accommodate various levels of **intrathoracic** expiratory pressures during CPR **chest compressions** . The threshold is adjusted by operating **compression** threshold control 96 which allows for maximum sensitivity without signal saturation to accurately detect changes in **intrathoracic** pressure. **Compression** threshold is control 96 is a 20-turn, 10,000 Ohm potentiometer that controls the...

...patient. Air volume
control 98 may be manually adjusted to accommodate a diverse range of **lung** capacities. As previously described, the precise amount of air or gases are delivered to the patient by use of plunger 52 in combination with **compressible** bag 44. In one alternatively, control 98 may also be employed to control the pressure...

...the respiratory gases inspired to the patient.

other features of control panel 38 include a **compression** counter display 100 which allows the rescuer to view the cumulative number of **compressions** . **Compression** counter display 100 may be configured to count the total number of **chest compressions** or the number of **chest compressions** between each ventilation. A **compression** detect display 102 is provided to allow the viewer to visualize the **compression** threshold sensitivity. Display 102 reflects the signal level from the,transducer amplifying circuit, and preferably comprises a bar-graph LED display that grossly represents the force of **compression** , i.e., the greater the applied force, the more LEDs that are illuminated.

When power...
...For example, if
mode control 88 is set to the compre ssion detection mode, and **compression** /ventilation control 92 is set to 5:1 (1 breath for every 5 **compressions**), ventilator ready display 104 will illuminate at the fourth **chest compression** . After the fifth **compression** has been detected, ventilator ready display 104 will be turned off. A ventilation display 106...

...when
actuated.

Referring now to Fig. 6, a schematic of the circuitry employed within ventilation **system** 10 will be described. The circuitry includes a **compression** sensing module 108 which is coupled to the strain gauge that in turn is disposed in pressure responsive **valve system** 14. As previously described, **compression** sensing module 108 preferably includes a Wheatstone-bridge to detect changes in

the resistivity of the strain gauge during **chest compressions** .

The **compression** sensing module 108 is coupled t-o a **compression** counter/display module 110. Module 110 counts the number of **compressions** sensed by module 108 and optionally displays them on **compression** counter display 100 on display panel 38 (see Fig. 5).

The circuitry further includes a...

...air volume control 98 and which is employed to actuate the mechanical components employed to **compress** bag 44 (see Fig. 3). These components are illustrated schematically as block 114 in Fig...

...of a capacitor timing circuit. This circuit in essence controls the duration that plunger 52 **compresses** bag 44. Since the speed of plunger 52 is internally set at a constant level...

...88 of control panel 38 (see Fig. 5). When mode control 88 is in the **compression** detect mode, module 112 will send a signal to actuate ventilation after a predetermined number of **compressions** have been counted by module 110.

Ventilation control module 112 is further coupled.to **compression** /ventilation control 92 so that ventilation control module 112 will know the number of **compressions** that must be is performed before a signal is sent to actuate ventilation.

Also coupled characteristics of **chest compression** may be monitored. For example, ventilation **system** 10 may measure the force at which **chest compressions** are being performed, the pressure being applied to the **chest** , and the depth of **chest compression** .

Optionally, such information may be displayed on control panel 38 (see Fig. 5). This display...

...display and produce audible signals at regular intervals to assist the rescuer in performing regular **chest compressions** .

The circuitry further includes a signal control module 122 which is used to control logic...

...display various physiologic characteristics of-the patient, including the pressure in the patient's airway. **compression** sensing module 108 is coupled to **compression** detect display 102 to visually display the strength of the signal being detected by module 108.

Compression sensing module 108 includes **compression** threshold control 96 as previously described. By adjusting control 96, the sensitivity of the **compression** detect display 102 may be modified. For example, display 102 may illuminate one LED bar when no **compressions** are being performed and 5 to 10 LED bars which a **chest compression** is applied.

As one example, prior to the initiation of CPR, and

with the ventilation **system** connected to the patient, the rescuer adjusts **compression** threshold control 96 to illuminate only one LED bar on **compression** detect display 102. This essentially sets the **compression** sensing circuitry in module 108 to represent zero force applied to the **chest** . Once **compressions** begin, the rescuer may monitor display 102 to "grossly" verify that an appropriate amount of force has been applied during **chest** **compressions** by observing that 5 to 10 LED bars on **compression** detect display 102 are illuminated. Referring back now to Fig. 1, operation of ventilation **system** 10 to assist in performing a CPR **procedure** will be described. Initially, ventilation **system** 10 is coupled to a patient via a coupling device, such as a facial mask...

...is turned
is to the on position and mode control 88 is placed in the **compression** detect mode. **Compression** /ventilation control 92 is adjusted to the desired **compression** /ventilation ratio. The patient then begins performing CPR as is known in the art.

When performing **chest** **compressions** , **compression** detect display 102 will light and grossly display the force of **compression** each time a **compression** is detected. Further, **compression** counter display 100 will display the number of **chest** **compressions** . When the preset number of **chest** **compressions** have been detected, ventilator 102 supplies a volume of respiratory gases to the patient through **valve** **system** 14 and counter display 100 is reset to zero. The volume of respiratory gases supplied...
...90. In
another option, bag 44 may be removed from ventilator 12 and coupled to **valve** **system** 14 so that ventilations may be manually provided to the patient by having the rescuer manually squeeze bag 44.

If the patient begins spontaneous breathing, flow control **valve** 24 (see Fig. 2) may be adjusted so that air may freely flow through **valve** **system** 14 to the patient's **lungs** .

During times when CPR is not being performed and it is still desired to ventilate...

...and
volume determined by control 98.

Since ventilator 112 has its own rechargeable battery, ventilation **system** 10 may be used **remotely** to facilitate its use in medical emergencies. Further, by providing a way to sense when **chest** **compressions** are being performed, ventilation may be easily coordinated with **chest** **compressions** without requiring the rescuer to concentrate on counting the number of **compressions** to ensure that regular ventilations are being supplied to the patient.

Fig..7 illustrates an alternative ventilation **system** 120 which includes a ventilator 122 which is similar to ventilator 12 as previously described...

...to a patient by an airway 124. Also coupled to a

ventilator 122 is a **compression** pad 126. Disposed in **compression** pad 126 is a strain gauge or load cell. In turn, these elements are coupled to ventilator 122 by a two conductor coaxial cable 128. **Compression** pad 126 is placed over the patient's sternum so that when the patient's **chest** is **compressed** (either manually or using an automated **compression** mechanism), the strain gauge or load cell generates a signal which is transmitted via cable 128 to the ventilator control circuitry in ventilator 122. In this way, **chest compressions** may be directly sensed. Ventilator 122 is then employed to periodically supply respiratory gases to...

...via airway 124 in a manner similar to that described in the previous embodiment.

Alternatively, **compression** pad 126 may be configured to be inflated with a fluid, such as air. With this arrangement, a pressure transducer is employed to detect pressure increases within the air filled **compression** pad so that **chest compressions** may be directly sensed. In one embodiment, cable 128 is replaced with a flexible, hollow...

...to a pressure transducer that is housed within ventilator 122. In this way, when the **compression** pad is **compressed** , the transducer within ventilator 122 detects the increase in pressure. In turn, signals genera ted...

...conducted to the ventilator control circuitry. Alternatively, the pressure transducer may be held within the **compression** pad (or another **compression** device), to detect an increase in pressure within the pad during **chest compressions** . A signal of the pressure transducer is then preferably transmitted via a two conductor coaxial...

...previously described, it is preferred to prevent respiratory gases from flowing to the patient's **lungs** during at least a portion of the **decompression** phase of CPR.

Alternative occlusion mechanisms for preventing air from entering into the patient's airway during the **decompression** phase are illustrated in Figs. 8A-11B. Such occlusion mechanisms may be coupled to the...

...configured to open and close based on information provided by the various sensors when sensing **chest compressions** . For example, the occlusion mechanisms may be configured to be closed until a specified time period after a **chest compression** has been detected to insure that sufficient time has passed during the **decompression** phase. At this point, the occlusion mechanisms are configured to open to allow respiratory gases to flow to the patient's **lungs** .

Various sensing mechanisms may also be provided to detect when the patient begins spontaneous breathing...

...mechanisms will be opened to allow the free flow of air into the patient's **lungs** . Further, the ventilators may be configured to open the various occlusion

mechanisms after a predetermined negative **intrathoracic** pressure level has been met or exceeded. In this way, the opening pressures of the...

...9B illustrate a linear actuator occlusion mechanism 142. occlusion mechanism 142 comprises a pair of **compression** members 144 and 146 that are disposed on opposite sides of an airway lumen 148...

...a linear actuator 152. As illustrated in Fig. 9B, when linear actuator 152 is actuated, **compression** member 144 is forced against airway lumen 148 to close airway lumen 148.

Figs. 10A...

...Figs'. 11A and 11B illustrate a caliper occlusion mechanism 158. Caliper occlusion mechanism 158 includes **compression** members 160 and 162 that are disposed between airway lumen 164. A pair of caliper...
...linear actuator 172 is operated, caliper arms 166 and 168 are brought together to force **compression** members 160 and 162 against airway lumen 164.

Figs. 12A and 12B illustrate a mesh...

Claim

1 A **system** for ventilating a patient in association with a cardiopulmonary resuscitation **procedure** , the **system** comprising:
a ventilator to periodically supply respiratory gases to a patient's **lungs** ;
a sensor to detect **chest compressions** ; and
a controller coupled to the sensor, the controller controlling actuation of the ventilator after a predetermined number of **chest compressions** have been detected by the sensor.

2 A **system** as in claim 1, wherein the controller is configured to actuate the ventilator to supply respiratory gases to the patient once about every 2 to about 10 **chest compressions** .

3 A **system** as in claim 1, wherein the sensor is configured to sense changes in **intrathoracic** pressure to detect **chest compressions** .

4 A **system** as in claim 1, further comprising a **valve** that is adapted to be placed in the patient's airway, and wherein the sensor is disposed to detect the flow of respiratory gases through the **valve** upon **compression** of the **chest** .

5 A **system** as in claim 4, wherein the sensor comprises a strain gauge which is strained as respiratory gases flow through the **valve** and deflect a diaphragm, and a resistance sensing circuit to sense a change in resistance of the strain gauge when strained.

6 A **system** as in claim 4, wherein the sensor is configured to detect an increase in pressure in the patient's

airway with each **chest compression** .

7 A **system** as in claim 4, wherein the **valve** includes a region to prevent respiratory gases from flowing to the **lungs** until a threshold negative **intrathoracic** pressure is exceeded at which time the **valve** opens'to allow the flow of respiratory gases to the **lungs** .

8 A **system** as in claim 1, further comprising a **chest compression** member coupled to the controller, and wherein the sensor is disposed to sense when a **compressive** force is applied to the **chest compression** member.

9 A **system** as in claim 8, wherein the **chest compression** member comprises a **chest** pad.

10 A **system** as in claim 1, wherein the sensor :2 comprises an impedance sensor to sense a change in impedance in the **chest** wall of the patient upon **compression** of the **chest** .

11 A **system** as in claim 1, wherein the ventilator comprises a **compressible** member and a **compression** mechanism to **compress** the **compressible** member.

12 A **system** as in claim 1, further comprising an occlusion mechanism to prevent respiratory gases from entering the patient's **lungs** during at least a portion of a **decompression** phase of the cardiopulmonary resuscitation **procedure** .

13 A **system** as in claim 12, wherein the occlusion mechanism comprises an airway and a threshold **valve** disposed in the airway.

14 A **system** as in claim 12, wherein the occlusion mechanism comprises an airway and a rotary cam wheel to **compress** the airway.

15 A **system** as in claim 12, wherein the occlusion mechanism comprises an airway, and a linear actuator and a **compression** member to **compress** the airway.

16 A **system** as in claim 12, wherein the occlusion mechanism comprises an airway, and a pair of caliper arms to **compress** the airway.

17 A **system** as in claim 12, wherein the occlusion mechanism has adjustable operating pressure levels to vary a threshold negative **intrathoracic** pressure level that must be exceeded before the occlusion mechanism will allow respiratory gases to flow to the patient's **lungs** .

18 A **system** as in claim 17, wherein the occlusion mechanism is coupled to the controller which is configured to operate the occlusion mechanism.

19 A **system** as in claim 1, further comprising a **compression** mechanism coupled to the controller to **compress** the **chest** .

20 A **system** as in claim 1, further comprising a power supply to supply power to the controller and the ventilator.

21 A **system** as in claim 1, further comprising at least one feedback sensor coupled to the controller.

22 A **system** as in claim 21, wherein the feedback sensor is selected from the group of sensors consisting of oxygen sensors, carbon dioxide sensors, temperature sensors, **chest compression** force sensors, depth of **chest compression** sensors, **chest compression** pressure sensors and pH sensors.

23 A **system** as in claim 1, further comprising a control panel having a mode control to change the operational mode of the ventilator.

24 A **system** as in claim 23, wherein the mode control includes a **compression** detect mode where the ventilator is actuated after the predetermined number of **chest compressions** have been detected by the sensor.

25 A **system** as in claim 23, wherein the mode control includes a manual ventilation mode, and wherein...

...actuate the ventilator when the mode control is in the manual ventilation mode.

26 A **system** as in claim 23, wherein the mode control includes an automatic ventilation mode, and wherein...

...timed intervals when the mode control is in the .5 automatic ventilation mode.

27 A **system** as in claim 23, wherein the control panel further includes a threshold **compression** control to vary the sensitivity level of the sensor.

28 A **system** as in claim 23, wherein the control panel further includes a respiratory gas volume control...

...control the volume of respiratory gases supplied by the ventilator upon each actuation.

29 A **system** as@in claim 23, wherein the control panel further includes a respiratory gas control to...

...the pressure of the respiratory gases delivered with each actuation of the ventilator.

30 A **system** as in claim 23, wherein the control panel further includes a **compression** counter display to display the number of detected **chest compressions** , and a **compression** detect display to display the detection of a **chest compression** .

31 A **system** as in claim 23, wherein the control panel includes a **compression** display to display **compression** pressures or forces supplied to the **chest** .

32 A **system** as in claim 23, wherein the control panel further includes a ventilation indicator to indicate when the ventilator is actuated.

33 A **method** for performing cardiopulmonary resuscitation, the **method** comprising:
repeatedly **compressing** a patient's **chest** ;
detecting each **chest** **compression** with a sensor that is coupled to a controller; and
periodically ventilating the patient after a predetermined number of **chest** **compressions** have been detected.

34 A **method** as in claim 33, further comprising ventilating the patient once about every 2 to about 10 **chest** **compressions** .

35 A **method** as in claim 33, further comprising placing a **valve** in the patient's airway, and wherein the sensing step comprises sensing when respiratory gases flow through the **valve** upon **compression** of the **chest** .
36 A **method** as in claim 35, further comprising preventing respiratory gases from flowing to the **lungs** with ,3 the **valve** until a threshold negative **intrathoracic** pressure is exceeded at which time the **valve** opens to allow the flow of respiratory gases to the **lungs** .

37 A **method** as in claim 33, further comprising sensing changes in **intrathoracic** pressure to detect **chest** **compressions** .

38 A **method** as in claim 33, further comprising sensing when a force has been applied to the patient's **chest** to detect **chest** **compressions** .

39 A **method** as in claim 33, further comprising preventing respiratory gases from entering into the patient's **lungs** during at least a portion of a **decompression** phase.

40 A **method** as in claim 39, further comprising varying an **intrathoracic** pressure level at which respiratory gases are allowed to enter into the patient's **lungs** during the **decompression** phase.
41 A **method** as in claim 33, further comprising manually **compressing** the patient's **chest** or providing **chest** **compressions** with a **compression** mechanism coupled to the controller.

42 A **method** as in claim 33, further comprising mechanically **compressing** an air bag to ventilate the patient.

43 A **method** as in claim 42, wherein the air bag is automatically **compressed** after the predetermined number of **chest** **compressions** have been detected.

44 A **method** as in claim 42, wherein **compression** of the air bag is manually actuated.

45 A **method** as in claim 33, further comprising stopping **compression** of the patient's **chest** and ventilating

the patient at regular intervals.
46 A **method** as in claim 33, further comprising sensing at least one physiologic parameter while performing **chest compressions** .
47 A **method** as in claim 44, wherein the physiologic parameter is selected from the group -consisting of oxygen, carbon dioxide, temperature and pH.

48 A **method** as in claim 46, further comprising visually displaying when each **chest compression** has been detected.

49 A **method** as in claim 46, further comprising counting the number of **chest compression** and displaying the number of counted **compressions** .

50 A **method** as in claim 33, further comprising visually displaying an indicator each time the patient is ventilated.

51 A **method** as in claim 33, further comprising controlling the volume of respiratory gases supplied to the...

...maintaining the supplied gases at the sensed pressure for a specified time period.
52 A **method** as in claim 33, further comprising sensing when the patient takes a spontaneous breath and initiating an inspiratory ventilation cycle to assist the patient's breathing.
I 53. A **method** as in claim 52, further comprising sensing when the patient begins regular spontaneous breathing and ceasing the inspiratory ventilation cycle.

54 A **method** as in claim 53, further comprising sensing if the patient stops spontaneous breathing and periodically ventilating the patient after the predetermined number of **chest compressions** have been detected.

55 A ventilation device comprising:
a **compressible** member;
a mechanical **compression** mechanism which is operable to **compress** the **compressible** member;
a coupling member attached to the **compressible** member to couple the **compressible** member to a patient's airway; and
a sensor to detect **chest compressions** .
56 A device as in claim 55, wherein the mechanical **compression** mechanism comprises a plunger having a rack, a stepping motor., and a pinion coupled to...

...to move the rack.

57 A device as in claim 55, wherein the mechanical
. 1
compression mechanism comprises a plunger and a **compressed** air cylinder to move the plunger.

58 A device as in claim 55, further comprising a threshold **valve** disposed in the coupling member, the threshold

valve being configured to open when experiencing a threshold negative **intrathoracic** pressure.

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Minimum documentation searched (classification **system** followed by classification symbols) U.S. : 128/204.189 204.23t 204.249 204.289...

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PULMONARY **PRESSURE MODULATOR**
MODULATEUR DE PRESSION PULMONAIRE
Patent Applicant/Assignee:
PIPER Samuel David,
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PIPER Samuel David,
Patent and Priority Information (Country, Number, Date):
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PULMONARY **PRESSURE MODULATOR**
MODULATEUR DE PRESSION PULMONAIRE
Main International Patent Class: **A61M-016/20**
Fulltext Availability:
Detailed Description
Claims

English Abstract
A dual area pressure **pulmonary** modulator apparatus which provides constant flow, pressure cycled ventilatory support to patients. The pressure **pulmonary** modulator apparatus opens at a selected pressure and shuts at a substantially lower pressure. The pressure **pulmonary** modulator apparatus can be incorporated into an automatic resuscitator suited for providing ventilatory support during...

...combined with a nebulizer to serve as a positive pressure aerosol therapy device. The pressure **pulmonary** modulator apparatus can also be incorporated into a percussive therapy device used for the mobilization of mucus in patients. The pressure **pulmonary** modulator apparatus may be made almost entirely of injection molded plastic and is inexpensive, portable...

French Abstract
L'invention concerne un appareil modulateur de pression **pulmonaire** zone duelle qui fournit une assistance ventilatoire a debit constant et a cycles de pression aux patients. Le modulateur de pression **pulmonaire** s'ouvre a une pression selectionnee et se ferme a une pression sensiblement plus faible. Le modulateur de pression **pulmonaire** peut etre incorpore a un reanimateur automatique servant a apporter une aide ventilatoire pendant la...

...servir de dispositif de traitement fournissant un aerosol a pression positive. Le modulateur de pression **pulmonaire** peut etre egalement incorpore a un dispositif de traitement a percussion servant a mobiliser le mucus des patients. Le modulateur de pression **pulmonaire** qui peut etre realise presque entierement en plastique moule par injection, est

peu couteux, portable...

Detailed Description

PULMONARY PRESSURE MODULATOR

BACKGROUND OF THE INVENTION

Field of the Invention

This invention pertains generally to respiratory ventilation devices, and more particularly to a constant flow **pulmonary** modulator which can be adapted to a number of applications including (1) a respiratory device...

...provided by clinicians through the use of a manual resuscitator or an automatic ventilatory device.

Manual resuscitators are typically equipped with a self-inflating **bag** , a set of check **valves** which control the direction of inhalation and exhalation gases, and a patient interface which is...

...the selfinflating bag thus applying pressure and causing gas to flow into the patient's **lungs** . Inhalation ends and exhalation begins when the operator stops squeezing the bag, allowing the pressurized gas in the patient's **lungs** to escape to the ambient environment. Most manual resuscitators are equipped with the means to maintain a small minimum positive pressure on the patient's **lungs** throughout exhalation commonly called **Positive End Expiratory Pressure** (**PEEP**). During exhalation, the self-inflating **bag** reinflates and the **process** may be repeated.

Manual resuscitators are simple and inexpensive. Unfortunately, manual
resuscitators are easy to misuse. A large number of...

...volumes or constant flow for pre-set amounts of time, regardless of the patient's **lung** compliance. **Lung** compliance is prone to sudden changes during transport, potentially causing patient airway pressures to increase...the volume delivered; thus volumes of gas delivered to the patient vary with variances in **lung** compliances, preventing the patient from receiving a harmful amount of pressure and insuring appropriate ventilation...

...in prior technology.

BRIEF SUMMARY OF THE INVENTION

The present invention generally comprises a pressure **pulmonary** modulator
apparatus which will inflate and discharge any pneumatic capacitance for a wide range of...

...when provided with a constant flow of gas. In a first embodiment, the patient's **lungs** serve as the pneumatic capacitance, which is cyclically inflated and discharged (inhalation followed by exhalation...

...of use and associated cost of a manual resuscitator.

In a second embodiment, the pressure **pulmonary** modulator is in fluid communication with an attached pneumatic capacitance which may be caused to...

...the patient which is in constant fluid communication with the primary cavity of
the pressure **pulmonary** modulator. The **pulmonary** capacitance may be

configured to oscillate at frequencies up to approximately 25 Hz during the...

...a nebulizer, providing therapeutic relief, in addition to the delivered ventilatory support. In either embodiment, **compressed** air or oxygen is delivered directly to the pneumatic capacitor, thus charging the pneumatic capacitor. During discharge, all gas flows through the pressure **pulmonary** modulator. The invention cycles the pneumatic capacitor by controlling at what pressure charging ends and...

...exhausted into the atmosphere. When the pneumatic capacitor pressure drops to a specified level, the **valve** of the pressure **pulmonary** modulator closes, and the pneumatic capacitor begins to be charged by the continuous flow of gas; thus the cycle is repeated indefinitely.

In the first embodiment, the pressure **pulmonary** modulator apparatus essentially comprises a dual area piston having a surface area that rests against...

...piston is in the open position. When the dual area piston is closed, it prevents **compressed** gas from escaping and causing the pneumatic capacitor to become charged by the incoming **compressed** gas. During charging, the pressure in the pneumatic capacitor increases until the force of the...

...the piston. During discharge, the exhaled gases pass by the piston and out of the **system** through an adjustable flow restrictor used to control the rate at which discharged gases are...may spontaneously breathe by triggering inhalation prior to the beginning of exhalation. A one-way **valve** may optionally be provided to increase the ease of the patient's inhalation. Under such...

...effects of aerosol in addition to ventilatory support.

In the second embodiment where the pressure **pulmonary** modulator apparatus is in fluid communication with a mechanical pneumatic capacitance, the pressure **pulmonary** modulator apparatus can be coupled with a nebulizer to deliver both a medication aerosol and high frequency bursts of **compressed** gas.

In such a configuration, when a patient inhales through a mouthpiece, he or she...

...oscillations are frequently called an intrapulmonary treatment, and has been shown to help mobilize patient **lung** secretions and fluids. It is worth noting that the second embodiment of the invention could...

...volume of the pneumatic capacitor and placing a fixed or variable restrictor between the pressure **pulmonary** modulator apparatus and the pneumatic capacitor, the second embodiment of the invention could be used ...

...ventilator apparatus which can be equipped, or have a built-in high pressure pop-off **valve** as a safety feature to prevent the unintended build up of patient airway pressure due to malfunction or misuse. Such a high pressure pop-off **valve** may be equipped with the means to produce an audible tone which will notify an...causes pressure dial 18 to move longitudinally relative to piston face 26, thereby increasing the

compressive force on spring 30 as pressure dial 18 is moved closer to piston face 26. Pressure dial 18 therefore allows adjustment of the **compressive** force of spring 30 against piston 12. Piston face 26 moves longitudinally within a cylindrical...this purpose, examples of which may include, but are not limited to the following: a **compressed** air spring; a sealed diaphragm; a balloon; an expandable chamber; a rigid chamber with **compressed** air and bellows.

Flow restrictor port 16 is located within housing 22 and is in...

...rate dial 20 allows control of a patient's exhalation duration. An annular flow restrictor **valve** seat 52 is located within flow restrictor port 16. Flow restrictor **valve** seat 52 functions in conjunction with tapered inner end 55 of rate dial 20 to...

...its largest setting and poses little restriction to flow.

The restricting area between flow restrictor **valve** seat 52 and the tapered inner end 55 of rate dial 20 is adjustable by...

...rate dial 20 causes tapered inner end 55 to move longitudinally relative to flow restrictor **valve** seat 52. Flow restrictor **valve** seat 52 and tapered inner end 55 at the inner end of rate dial 20 functions similar to a needle **valve** to create a restrictive annular region to restrict the flow of gas therethrough. Slots 54...

...the adjustment range of rate dial 20. Use of tapered inner end 55 and annular **valve** seat 52 provides for a sensitive adjustment of gas flow resistance. Although the preferred embodiment...

...inner end 55 of rate dial 20 with slots 54 therein along with flow restrictor **valve** seat 52 to restrict gas flow therethrough, those skilled in the art would recognize that...

...until the force of the patient's airway pressure on piston face 26 overcomes the **compressive** force of spring 30, which causes piston 12 to open (when piston face 26 moves away from interior end 28 of primary port 14). Once piston 12 begins to open, **compressed** gas from the
pneumatic capacitor enters chamber 42 and rushes toward flow restrictor port 16...

...the passage of gas through flow restrictor port 16 is restricted by annular flow restrictor **valve** seat 52 and tapered inner end 55 of rate dial 20. This gas restriction causes...

...by the pneumatic capacitor. Although such a feature duration. In the preferred embodiment, patient demand **valve** 72 has a very low resistance to flow, which is on the order of approximately...

...mask 86 or an endotracheal tube (not shown) which the patient wears during the breathing **process** associated with resuscitator 78. Because the piston 12 is closed during inhalation, all incoming gas...

...masks (not shown) and a 15 mm ID for connection to endotracheal tubes.

Pop-off **valve** 70 provides a safety feature to prevent the patient airway
pressure from exceeding any set value. Pop-off **valve** 70 is biased by spring 88 and equipped with a sealing O-ring 90. Pop-off **valve** 70 opens

anytime the patient's airway pressure exceeds a preset value. Pop-off **valve** 70 has a stem 92 which travels within an axial tube 94 within end cap 96. Pop-off **valve** 70 can also be equipped with a means to create an audible tone and a visual signal when the **valve** 70 is opened.

When inhalation pressure reaches that which is dialed on pressure dial 18 ...

...piston face 26 and the surface area circumscribed by Oring 62. Pressure dial 18 and **pulmonary** modulator spring 30 are designed so that the resuscitator delivers a maximum pneumatic capacitor peak...

...20 cm H20, although this is not the physical limit of the apparatus.

Pop-off **valve** 70 is designed to relieve pressure if the patient's airway pressure rises above approximately 60 cm H20It will be appreciated that patient adapter 66 may also include a dump **valve** which is in fluid connection with the patient's airway, thus allowing for the quick...
...closed, allowing for quick restart of inhalation.

Referring also to FIG. 5 and FIG 6A, **pulmonary** modulator apparatus 10 can be adapted to function as a positive pressure aerosol device 98, wherein a nebulizerassemblyl00isaftachedtoprimaryportl4of **pulmonarymodulator** apparatus 1 0. Such a device functions identically as previously described with a nebulizer assembly...

...102 having a mouthpiece 104, an air entrainment port 106, a one-way air demand **valve** assembly 108, a reservoir 1 1 0 with a primary orifice 1 1 2 located...

...baffle 114 with a secondary orifice 116. In this configuration, there is no pop-off **valve** and the patient breathes through mouthpiece 104.

Top cover 102 includes a nebulizer chamber 118 located beneath, one-way demand **valve** 108 built into the upper portion of the top cover 102, and an elbow receptacle...

...which allows nebulizer assembly 1 00 to be attached to primary port 14 of the **pulmonary** modulator apparatus 10 via an elbow connector 122. Oneway demand **valve** assembly 108 permits air to be entrained into positive pressure aerosol device 98 as may...

...use by the patient but does not allow any gas pressure to escape externally. Demand **valve** assembly 108 includes a cylindrical **valve** body 124 inserted into an air entrainment port 106 located adjacent the upper portion of...

...A flapper 126 is inserted into air entrainment port 106 between top cover 102 and **valve** body 124. Demand **valve** assembly ...allows for connection of nippled oxygen tubing which is commonly used in hospitals to supply **compressed** gas. Those skilled in the art will appreciate that many different nebulizers and pneumatic arrangements...

...configuration.

Percussive therapy device 130 delivers both a medication aerosol and high frequency bursts of **compressed** gas. When a patient inhales through mouthpiece 104, the patient entrains air through air entrainment...

...cm H20. The delivery of aerosol and the high frequency airway oscillations help mobilize patient **lung** secretions and fluids.

PTD 130 functions by receiving **compressed** gas, typically above approximately 15 psig, through **compressed** gas inlet 136. **Compressed** gas inlet 136 is built into pneumatic capacitor top 138 and supplies **compressed** gas through a channel 142 within pneumatic capacitor top 138 to pneumatic capacitor assembly 132...should be noted that any number of different springs can be used to accomplish different **pulmonary** effects. When pressure modulator piston 12 is closed, pneumatic capacitor choke 140 is delivering gas...during the time the mucus is being mobilized, the average speed of gas in the **lungs** is directed out and not into the **lung** . In the event that cycling during other phases of the respiratory cycle were beneficial, PTD...

...pneumatic capacitor. Although such a device would be significantly bulkier, and force required for the **valve** to overcome the pneumatic capacitor's pressure during exhalation, thus sealing interior end 160 of ...

...of sealed diaphragm 168, whereby rotating the dial 166 in one direction causes it to **compress** diaphragm 168 and rotating it in another direction causes it to **decompress** diaphragm 168.
Thus, dial 166 allows adjustment of sealed diaphragm's 168 internal pressure.

Although...

...interior end 160 of primary port 162 having a tapered seat 178 which mates with **valve** 164 to seal the interior end 160 of primary port 162, any similar means of sealing interior end 160 of inlet port 162 will suffice. **Valve** 164 is circumscribed by a groove 180 within which an O-ring 182 is fitted...

Claim
... port;
(c) a gas inlet port in fluid communication with said adapter body whereby a **compressed** gas source can be attached to said adapter body; and
(d) a patient connection port...

...8 An apparatus as recited in claim 7, further comprising:
(a) a one-way flapper **valve** , said flapper **valve** in fluid communication
with said adapter body, said flapper **valve** capable of permitting airflow into said
adapter body; and
(b) means to automatically release gas...capacitor, said pneumatic capacitor in fluid
communication with said primary port.

12 A positive pressure **pulmonary** apparatus, comprising:
(a) a chamber, said chamber including a sleeve;
(b) a primary port, said...
...inlet port, said gas inlet port in fluid communication with said adapter body whereby a **compressed** gas source can be attached to said patient adapter; and
(d) a patient connection port...

...16 An apparatus as recited in claim 15, further comprising:
(a) a one-way flapper **valve** , said flapper **valve** in fluid communication
with said adapter body, said flapper **valve** capable of permitting airflow into said
adapter body; and
(b) means to automatically release gas...said secondary orifice in fluid communication
with said nebulizer chamber; and
(d) a one-way **valve** , said **valve** located within said air entrainment port, said **valve** capable of entraining air into said nebulizer chamber.

26 A positive pressure **pulmonary** apparatus, comprising:
(a) **valve** means for sealing off flow communication with a patient airway, said **valve** means including a surface area capable of fluidly communicating with said patient airway, said **valve** means capable of being opened and closed, whereby said surface area is capable of fluidly communication with said patient's airway when said **valve** means is closed is less than said surface area capable of fluidly communicating with said patient airway when said **valve** means is open; (b) a flow restrictor, said flow restrictor in fluid communication with said patient airway when said **valve** means is open and not in flow communication with said patient airway when said **valve** means is closed;
(c) a restoring force acting on said **valve** mean, said restoring force biasing said **valve** means to close in the absence of a force sufficient to maintain
said **valve** means open;
(d) wherein said **valve** means closes and inhalation begins at one pressure, thereby causing said patient to become inflated and an airway pressure to increase and causing said **valve** means to open and exhalation to begin at a
second pressure; and
(e) wherein exhaled...

...delivery of gas to said apparatus.

30 A constant flow, percussive therapy device, comprising:
(a) **valve** means for sealing off flow communication with a pneumatic capacitor, said **valve** means including a surface area, said **valve** means capable of
being opened and closed;
(b) wherein said pneumatic capacitor providing a pressure acting to open said **valve** mean, said pneumatic capacitor in fluid communication with said **valve** surface area, wherein said **valve** surface area in fluid communication with said pneumatic capacitor is less when said **valve** means is closed than when said
valve means is open;
(c) a restoring force acting on said **valve** means, said restoring force acting in opposition to said opening pressure in a manner as to cause said **valve**
means to close in the absence of said opening pressure;
(d) a chamber, said chamber...

...a flow restrictor, said flow restrictor in fluid communication with said pneumatic capacitor when said **valve** is open and not in fluid communication with
said pneumatic capacitor when said **valve** is closed; and
(g) a patient breathing port, said port in fluid communication with said flow restrictor, said port in fluid communication with said chamber when said **valve** means is open.

31 An apparatus as recited in claim 30, further comprising an aerosol...

...breathing port.

32 An apparatus as recited in claim 31, further comprising an air entrainment **valve** , said **valve** in fluid communication with said patient breathing port, said **valve** including means to allow gas to enter said device when a third pressure within said device is less than atmospheric pressure, said **valve** including means to prevent gas from escaping from said device when a fourth pressure within...

```
Set     Items   Description
S1       1082   AU=(LURIE K? OR LURIE, K? OR MENK V? OR MENK, V? OR ZIELIN-
            SKI T? OR ZIELINSKI, T? OR BIONDI J? OR BIONDI, J?)
S2      52120   CPR OR (CARDIOPULMON? OR CARDIO()PULMON?)(W)(RESUSCIT? OR -
            RESPIRAT? OR VENTILAT? OR CIRCULAT?) OR MANUAL?()RESUSC? OR E-
            MERGENCY()MEDICAL?
S3      55258   PEEP OR PEP OR POSITIVE()(ASSIST? OR PRESSUR?)(2N)(BREATH?
            OR VENTILAT? OR RESPIRAT?) OR POSITIVE()END()EXPIR?()PRESSURE
            OR (MEDICAL OR EMT OR FIRE)(2N)RESCUE?
S4     195395   VACUUM? OR SUCTION? OR NEGATIVE()PRESSURE? OR EXTRACT?(3N)-
            (POSITIVE OR RESPIRAT? OR EXPIRAT? OR EXHAL?)
S5     106439   BAG OR BAGS OR SACK? ? OR SMARTBAG? OR SMART()BAG OR AMBUB-
            AG? OR AMBU OR POUCH?? OR BELLOW?
S6     732041   MANIPULAT? OR DECOMPRESS? OR COMPRESS?
S7    2648650   THORAX? OR THORAC? OR CHEST??? OR LUNG? ? OR PULMON? OR IN-
            TRATHORA?
S8      16732   VENOUS(2N)(RETURN OR CIRCULAT?) OR (BLOODFLOW? OR BLOOD()F-
            LOW? OR BLOOD()CIRCULAT?)(2N)(RETURN? OR BACK)(2N)(HEART? OR -
            CARDIAC?) OR LOWER?()PRESSUR?(2N)(RIGHT()ATRIUM) OR LOWER?()P-
            RESSUR?(2N)(THORAX? OR THORAC?)()VENA()CAVA
S9     290908   VALVE??? OR VALVING
S10    663328   HYPOTENS? OR HYPOTENT? OR LOW()BLOOD()PRESSURE OR HEAD()(T-
            RAUMA? OR INJUR?) OR CARDIAC()ARREST OR HEART()ATTACK OR MYOC-
            ARD?()INFARCT? OR (HEMORRHAG? OR HAEMORRHAG?)()SHOCK? OR BLOO-
            D()LOSS??
S11   2583850   WIRELESS? OR WIRE()LESS? OR REMOTE? OR RADIO? OR TRANSPOND?
            OR TELECOMMUNICAT?
S12  10634152   METHOD? ?
S13  16686002   SYSTEM? ?
S14   5347076   TECHNIQUE? ?
S15   1913553   PROCEDURE? ?
S16   3490557   PROCESS??
S17       330   S2:S3(10N)S5
S18         0   S17 AND S8
S19        10   S17 AND S11
S20       116   S17 AND S9
S21         3   S20 AND S4
S22        79   S20 AND S7
S23        68   S22 AND S12:S16
S24        14   S22 AND S10
S25        91   S19 OR S21:S24
S26        51   RD (unique items)
? show files
File 155:MEDLINE(R) 1966-2004/May W2
         (c) format only 2004 The Dialog Corp.
File   5:Biosis Previews(R) 1969-2004/May W2
         (c) 2004 BIOSIS
File  73:EMBASE 1974-2004/May W2
         (c) 2004 Elsevier Science B.V.
File  71:ELSEVIER BIOBASE 1994-2004/May W1
         (c) 2004  Elsevier Science B.V.
File 144:Pascal 1973-2004/May W2
         (c) 2004 INIST/CNRS
File  94:JICST-EPlus 1985-2004/Apr W3
         (c)2004 Japan Science and Tech Corp(JST)
File 583:Gale Group Globalbase(TM) 1986-2002/Dec 13
         (c) 2002 The Gale Group
?
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NON PAT LIT

BIBLIOG. MEDICAL FILES

SEARCH EDITED FILES

26/3,K/44 (Item 8 from file: 73)
DIALOG(R)File 73:EMBASE

06135671 EMBASE No: 1995168763
Flow-dependent properties of positive expiratory pressure devices
Christensen E.F.; Jensen R.H.; Schonemann N.K.; Petersen K.D.
Dept. of Anesthesiology, Arrhus Kommunehospital, University Hospital of Arrhus,Arrhus Denmark
Monaldi Archives for Chest Disease (MONALDI ARCH. CHEST DIS.) (Italy) 1995, 50/2 (150-153)
CODEN: MACDE ISSN: 1122-0643
DOCUMENT TYPE: Journal; Article
LANGUAGE: ENGLISH SUMMARY LANGUAGE: ENGLISH

Valves for positive expiratory pressure (PEP) can be characterized as threshold resistors, ideally providing pressure independent...

...resistor type compared to threshold resistor devices. Pressures were measured on three different flow resistor **valves** : the PEP-mask, the Pari-PEP- **System** and the **System** 22-PEP with orifice diameters of 1.5-5.0 mm; and on three threshold resistors, the underwater seal, the **Ambu Positive End - Expiratory Pressure** (**PEEP**) **valve** and the Vital Signs **PEEP valve** with pressures of 0, 5, 10, 15 and 20 cmHinf 2O. All devices were studied...
...120 and 150 l-minsup -sup 1. The PEP-mask, the Pari-PEP and the **System** 22-PEP showed the typical pattern of flow resistors, i.e. a pressure increasing with flow, dependent on the diameter of the orifice. The underwater seal and the Vitral Signs **PEEP valves** acted as almost ideal threshold resistors. The **Ambu PEEP valves** acted as threshold resistors at the lower flows, but showed flow-dependency at higher flows. The Vital Signs **PEEP valves** gave lower pressures and **Ambu** PEEP **valves** gave higher pressures compared with indicated values, whereas the underwater seal gave the intended pressure...
MEDICAL DESCRIPTORS:
airflow; article; artificial ventilation; calibration; comparative study; controlled study; expiratory flow; pressure; **valve**
SECTION HEADINGS:
015 **Chest** Diseases, **Thoracic** Surgery and Tuberculosis
024 Anesthesiology
027 Biophysics, Bioengineering and Medical Instrumentation

26/3,K/49 (Item 13 from file: 73)
DIALOG(R)File 73:EMBASE

01625786 EMBASE No: 1980183461
Effect of AMBU - PEEP - valve **on respiration, blood gases and hemodynamics during spontaneous breathing of air**
Saev S.K.; Jordanova-Ivanova S.T.; Hinkov O.D.
Inst. Cardiovasc. Dis., Med. Acad., 1309 Sofia Bulgaria
Anaesthesiologie und Reanimation (ANAESTHESIOL. REANIM.) (Germany) 1980, 5/1 (50-58)
CODEN: ANRED
DOCUMENT TYPE: Journal
LANGUAGE: ENGLISH SUMMARY LANGUAGE: GERMAN

Effect of AMBU - PEEP - valve **on respiration, blood gases and hemodynamics during spontaneous breathing of air**

A non-rebreathing **system** for respiration with **positive end expiratory pressure** was constructed, consisting of a non-rebreathing value (**AMBU** -E- **valve**) and a **PEEP** - **valve** (**AMBU** - **PEEP** - **valve**). The study was performed on 18 healthy volunteers in order to find the most suitable...

...0.5 kPa) applied at short time intervals between the phases is proposed as the **method** of choice in clinical and first aid conditions for improvement of blood oxygenation. Construction of...
MEDICAL DESCRIPTORS:
*artificial ventilation; *cardiovascular **system** ; *positive end expiratory pressure
therapy; respiratory **system**
SECTION HEADINGS:
024 Anesthesiology
015 **Chest** Diseases, **Thoracic** Surgery and Tuberculosis

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Set      Items   Description
S1         725   AU=(LURIE K? OR LURIE, K? OR MENK V? OR MENK, V? OR ZIELIN-
                 SKI T? OR ZIELINSKI, T? OR BIONDI J? OR BIONDI, J?)
S2       23411   CPR OR (CARDIOPULMON? OR CARDIO()PULMON?)(W)(RESUSCIT? OR -
                 RESPIRAT? OR VENTILAT? OR CIRCULAT?) OR MANUAL?()RESUSC? OR E-
                 MERGENCY()MEDICAL?
S3       25940   PEEP OR PEP OR POSITIVE()(ASSIST? OR PRESSUR?)(2N)(BREATH?
                 OR VENTILAT? OR RESPIRAT?) OR POSITIVE()END()EXPIR?()PRESSURE
                 OR (MEDICAL OR EMT OR FIRE)(2N)RESCUE?
S4      449257   VACUUM? OR SUCTION? OR NEGATIVE()PRESSURE? OR EXTRACT?(3N)-
                 (POSITIVE OR RESPIRAT? OR EXPIRAT? OR EXHAL?)
S5      111606   BAG OR BAGS OR SACK? ? OR SMARTBAG? OR SMART()BAG OR AMBUB-
                 AG? OR AMBU OR POUCH?? OR BELLOW?
S6     1027947   MANIPULAT? OR DECOMPRESS? OR COMPRESS?
S7      840507   THORAX? OR THORAC? OR CHEST??? OR LUNG? ? OR PULMON? OR IN-
                 TRATHORA?
S8        4117   VENOUS(2N)(RETURN OR CIRCULAT?) OR (BLOODFLOW? OR BLOOD()F-
                 LOW? OR BLOOD()CIRCULAT?)(2N)(RETURN? OR BACK)(2N)(HEART? OR -
                 CARDIAC?) OR LOWER?()PRESSUR?(2N)(RIGHT()ATRIUM) OR LOWER?()P-
                 RESSUR?(2N)(THORAX? OR THORAC?)()VENA()CAVA
S9      190483   VALVE??? OR VALVING
S10     275879   HYPOTENS? OR HYPOTENT? OR LOW()BLOOD()PRESSURE OR HEAD()(T-
                 RAUMA? OR INJUR?) OR CARDIAC()ARREST OR HEART()ATTACK OR MYOC-
                 ARD?()INFARCT? OR (HEMORRHAG? OR HAEMORRHAG?)()SHOCK? OR BLOO-
                 D()LOSS??
S11    2982531   WIRELESS? OR WIRE()LESS? OR REMOTE? OR RADIO? OR TRANSPOND?
                  OR TELECOMMUNICAT?
S12    7853682   METHOD? ?
S13   11650221   SYSTEM? ?
S14    4338798   TECHNIQUE? ?
S15    1671492   PROCEDURE? ?
S16    5044645   PROCESS??
S17          0   IC=(A62B? OR A61G? OR A61M?)
S18        305   S2:S3 AND S5
S19        305   S18 NOT S1
S20          0   S19 AND S8
S21         82   S19 AND S9
S22         11   S19 AND S11
S23         92   S21:S22
S24         80   S23 AND (S4 OR S6:S7 OR S10 OR S12:S16)
S25         80   RD (unique items)
? show files
File  94:JICST-EPlus 1985-2004/Apr W3
         (c)2004 Japan Science and Tech Corp(JST)
File  95:TEME-Technology & Management 1989-2004/May W1
         (c) 2004 FIZ TECHNIK
File  99:Wilson Appl. Sci & Tech Abs 1983-2004/Apr
         (c) 2004 The HW Wilson Co.
File  35:Dissertation Abs Online 1861-2004/Apr
         (c) 2004 ProQuest Info&Learning
File 111:TGG Natl.Newspaper Index(SM) 1979-2004/May 17
         (c) 2004 The Gale Group
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         (c) 2002 The Gale Group
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File   8:Ei Compendex(R) 1970-2004/May W2
         (c) 2004 Elsevier Eng.  Info. Inc.
File  34:SciSearch(R) Cited Ref Sci 1990-2004/May W2
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          (c) 2004 Inst for Sci Info
File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec
          (c) 1998 Inst for Sci Info
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          (c) 2004 BLDSC all rts. reserv.
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          (c) 2004 The New York Times
File 475:Wall Street Journal Abs 1973-2004/May 14
          (c) 2004 The New York Times
File 481:DELPHES Eur Bus 95-2004/May W1
          (c) 2004 ACFCI & Chambre CommInd Paris
File  48:SPORTDiscus 1962-2004/May
          (c) 2004 Sport Information Resource Centre
File  50:CAB Abstracts 1972-2004/Apr
          (c) 2004 CAB International
?
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25/3,K/14 (Item 3 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

12259726 Genuine Article#: 747QZ No. References: 10
Title: A pilot study to evaluate the SMART BAG **(R): A new pressure-responsive, gas-flow limiting** bag - valve **-mask device**
Author(s): Wagner-Berger HG (REPRINT) ; Wenzel V; Voelckel WG; Rheinberger K; Stadlbauer KH; Muller T; Augenstein S; von Goedecke A; Lindner KH; Keller C
Corporate Source: Leopold Franzens Univ,Dept Anesthesiol & Crit Care Med,Anichstr 35/A-6020 Innsbruck//Austria/ (REPRINT); Leopold Franzens Univ,Dept Anesthesiol & Crit Care Med,A-6020 Innsbruck//Austria/
Journal: ANESTHESIA AND ANALGESIA, 2003, V97, N6 (DEC), P1686-1689
ISSN: 0003-2999 Publication date: 20031200
Publisher: LIPPINCOTT WILLIAMS & WILKINS, 530 WALNUT ST, PHILADELPHIA, PA 19106-3621 USA
Language: English Document Type: ARTICLE (ABSTRACT AVAILABLE)

Title: A pilot study to evaluate the SMART BAG **(R): A new pressure-responsive, gas-flow limiting** bag - valve **-mask device**
...Abstract: be important to minimize the risk of stomach inflation when ventilating an unprotected airway with **positive pressure ventilation** . In this study, we assessed the effects of a standard self-inflating **bag** compared with a new pressure-responsive, inspiratory gas flow-limiting device (**SMART BAG** (R)) on respiratory mechanics in 60 adult patients undergoing routine induction of anesthesia. Respiratory variables were measured using a **pulmonary** monitor. The **SMART BAG** (R) resulted in significantly decreased inspiratory flow rate and peak airway pressure while providing adequate ...

25/3,K/16 (Item 5 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

11710192 Genuine Article#: 684XE No. References: 18
Title: Decreasing peak flow rate with a new bag - valve **-mask device: effects on respiratory mechanics, and gas distribution in a bench model of an unprotected airway**
Author(s): Wagner-Berger HG (REPRINT) ; Wenzel V; Stallinger A; Voelckel WG ; Rheinberger K; Stadlbauer KH; Augenstein S; Dorges V; Lindner KH; Hormann C
Corporate Source: Innsbruck Univ,Dept Anaesthesiol & Crit Care Med,Anichstr 35/A-6020 Innsbruck//Austria/ (REPRINT); Innsbruck Univ,Dept Anaesthesiol & Crit Care Med,A-6020 Innsbruck//Austria/; Univ Kiel,Dept Anaesthesiol,Kiel//Germany/
Journal: RESUSCITATION, 2003, V57, N2 (MAY), P193-199
ISSN: 0300-9572 Publication date: 20030500
Publisher: ELSEVIER SCI IRELAND LTD, CUSTOMER RELATIONS MANAGER, BAY 15, SHANNON INDUSTRIAL ESTATE CO, CLARE, IRELAND
Language: English Document Type: ARTICLE (ABSTRACT AVAILABLE)

Title: Decreasing peak flow rate with a new bag 1- valve **-mask device: effects on respiratory mechanics, and gas distribution in a bench model of an...**
...Abstract: in order to minimise the risk of stomach inflation when ventilating an unprotected airway with **positive pressure ventilation** . The purpose of this study was to assess the effects of a newly developed **bag - valve** -mask device (**SMART BAG** (R), O-Two **Systems** International, Ont., Canada) that limits peak inspiratory flow. A bench model simulating a patient with an unintubated airway was used consisting of a face mask, manikin head, training **lung** (**lung** compliance, 100 ml/cm H2O, airway resistance 4 cm H2O/1/S, lower oesophageal sphincter...

...stomach). Twenty nurses were randomised to each ventilate the manikin using a standard single person **technique** for 1 min (respiratory rate, 12/min) with either a standard adult self-inflating **bag** , or the **SMART BAG** (R). The volunteers were blinded to the experimental design of the model until completion of the experimental protocol. The **SM**ART **BAG** (R) vs. standard self-inflating **bag** resulted in significantly (P < 0.05) lower mean+/-S.D. peak inspiratory flow rates (32...

...vs. 61+/-13 1/min), peak inspiratory pressure (12+/-2 vs. 17+/-2 cm H2O), **lung** tidal volumes (525+/-111 vs. 680+/-154 ml) and stomach tidal volumes (0+/-0 vs...
...785+/-172 ml) were comparable. The mask leakage observed is not an uncommon factor in **bag - valve** -mask ventilation with leakage fractions of 25-40% having been previously reported. The differences observed between the standard BVM and the **SMART BAG** (R) are due more to the anatomical design of the mask and the non-anatomical...

...interface and should introduce a standardized mask leakage fraction. The use of a two-person **technique** may have removed the problem of mask leakage. In conclusion, using the **SMART BAG** (R) during simulated ventilation of an unintubated patient in respiratory arrest significantly decreased inspiratory flow...

...and resulted in a significantly longer inspiratory time when compared to a standard self-inflating **bag** . (C) 2003 Published by Elsevier Science Ireland Ltd.

...Identifiers--BASIC LIFE-SUPPORT; **CARDIOPULMONARY - RESUSCITATION** ;
TIDAL VOLUMES; VENTILATION; PRESSURE; ARREST; RISK

25/3,K/18 (Item 7 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

11500469 Genuine Article#: 657NQ No. References: 18
Title: Optimizing bag - valve **-mask ventilation with a new mouth-to-** bag **resuscitator**
Author(s): Wagner-Berger HG (REPRINT) ; Wenzel V; Stallinger A; Voelckel WG ; Rheinberger K; Augenstein S; Herff H; Idris AH; Dorges V; Lindner KH; Hormann C
Corporate Source: Innsbruck Univ,Dept Anesthesiol & Crit Care Med,Anichstr 35/A-6020 Innsbruck//Austria/ (REPRINT); Innsbruck Univ,Dept Anesthesiol & Crit Care Med,A-6020 Innsbruck//Austria/; Univ Florida,Coll Med, Dept Emergency Med,Gainesville//FL/; Univ Kiel,Dept Anesthesiol,Kiel//Germany/
Journal: RESUSCITATION, 2003, V56, N2 (FEB), P191-198
ISSN: 0300-9572 Publication date: 20030200
Publisher: ELSEVIER SCI IRELAND LTD, CUSTOMER RELATIONS MANAGER, BAY 15, SHANNON INDUSTRIAL ESTATE CO, CLARE, IRELAND
Language: English Document Type: ARTICLE (ABSTRACT AVAILABLE)

Title: Optimizing bag - valve **-mask ventilation with a new mouth-to-** bag **resuscitator**
Abstract: When ventilating an unintubated patient with a self-inflating **bag** , high peak inspiratory flow rates may result in high peak airway pressure with subsequent stomach inflation; this may occur frequently when rescuers without daily experience in **bag** - **valve** -mask ventilation need to perform advanced airway management. The purpose of this study was to assess the effects of a newly developed self-inflating **bag** (mouth-to- **bag** resuscitator; **Ambu** , Glostrup, Denmark) that limits peak inspiratory flow. A bench model simulating a patient with an unintubated airway was used, consisting of a face mask, manikin head, training **lung** (**lung** compliance, 100 ml/0.098 kPa (100 ml/cm H(2)OA airway resistance, 0...

...manikin for 1 min (respiratory rate: 12 per minute) with either a standard self-inflating **bag** or the mouth-to- **bag** resuscitator, which requires the rescuer to blow up a single-use balloon inside the self-inflating **bag** , which in turns displaces air towards the patient. When supplemental oxygen is added, ventilation with...

...be obtained, since expired air is only used as the driving gas. The mouth-to- **bag** resuscitator therefore allows two instead of one hand sealing the mask on the patient's...

...the experimental design of the model until completion of the experimental protocol. The mouth-to- **bag** resuscitator versus standard self-inflating **bag** resulted in significantly ($P < 0.05$) higher mean +/- S.D. mask tidal volumes (1048 +/- 161 vs. 785 +/- 174 ml) and **lung** tidal volumes (911 +/- 148 vs. 678 +/- 157 ml), longer inspiratory times (1.7 +/- 0.4...

...volumes (16 +/- 30 vs. 18 +/- 35 ml) were comparable. In conclusion, employing the mouth-to- **bag** resuscitator during simulated ventilation of an unintubated patient in respiratory arrest significantly decreased inspiratory flow rate and improved **lung** tidal volumes, while decreasing mask leakage. (C) 2002 Elsevier Science Ireland Ltd. All rights reserved.
...Identifiers-- **CARDIOPULMONARY - RESUSCITATION** ; TIDAL VOLUMES; RESPIRATORY **SYSTEM** ; AIRWAY PRESSURE; STOMACH; ARREST; RISK

BLANK

25/3,K/54 (Item 43 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

06586614 Genuine Article#: ZC716 No. References: 15
Title: Effectiveness of mask ventilation in a training mannikin. A comparison between the Oxylator EM100 and the bag - valve **device**
Author(s): Osterwalder JJ (REPRINT) ; Schuhwerk W
Corporate Source: KANTONSSPITAL,DEPT EMERGENCY & SURG/CH-9007 ST GALLEN//SWITZERLAND/ (REPRINT)
Journal: RESUSCITATION, 1998, V36, N1 (JAN), P23-27
ISSN: 0300-9572 Publication date: 19980100
Publisher: ELSEVIER SCI IRELAND LTD, CUSTOMER RELATIONS MANAGER, BAY 15, SHANNON INDUSTRIAL ESTATE CO, CLARE, IRELAND
Language: English Document Type: ARTICLE (ABSTRACT AVAILABLE)

...**Title: of mask ventilation in a training mannikin. A comparison between the Oxylator EM100 and the** bag - valve **device**
...Abstract: study in a training mannikin to find out whether the Oxylator EM100, compared with the **bag** , obtains improved ventilation and a decrease in gastric inflation. In a randomized crossover study, 72...

...the operating theatre, emergency department and intensive care unit of two hospitals. We used the **Ambu** (R)- **Bag** Mark III with mask No. 4, the Oxylator EM100 with a pressure setting of 35 cm H2O run in the manual setting, the **Ambu** (R)-Man C mannikin as well as the **Ambu** (R)-**CPR** computer program. The resuscitation cycles of the standard two-rescuer's adult **procedure** lasted 3 min each, with a 3-min pause between the crossover **procedure** . The participants could improve their ventilatory volume with the Oxylator EM100 by 635 ml (95% confidence interval 578-692 ml) compared with the **bag** ventilation. The number of subjects who could attain a mean ventilatory volume of 800 ml or more increased from 15% to 98.6% ($P < 0.001$). Compared with the **bag** , the increase of adequate respirations (greater than or equal to 800 ml) obtained by the...

...the Oxylator EM100. The Oxylator EM100 showed significantly better results in the mannikin than the **bag** . Of most importance is a significant lowering of gastric inflation and less so a marked increase in ventilatory volume. Our trial **procedure** with a relatively high **lung** compliance and a high oesophageal sphincter opening simulated favorable conditions. Owing to a large in...
...Identifiers-- **CARDIOPULMONARY RESUSCITATION**

25/3,K/77 (Item 66 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

01313541 Genuine Article#: GN718 No. References: 7
Title: MANUAL RESUSCITATORS **AND SPONTANEOUS VENTILATION - AN EVALUATION**
Author(s): MILLS PJ; BAPTISTE J; PRESTON J; BARNAS GM
Corporate Source: UNIV MARYLAND,DEPT ANESTHESIOL,ANESTHESIOL RES LABS,ROOM 534,MSTF,10 S PINE ST/BALTIMORE//MD/21201; UNIV MARYLAND,DEPT ANESTHESIOL,ANESTHESIOL RES LABS,ROOM 534,MSTF,10 S PINE ST/BALTIMORE//MD/21201
Journal: CRITICAL CARE MEDICINE, 1991, V19, N11, P1425-1431
Language: ENGLISH Document Type: ARTICLE (Abstract Available)

Title: MANUAL RESUSCITATORS **AND SPONTANEOUS VENTILATION - AN EVALUATION**
Abstract: Background and **Methods** : Although it is useful in certain clinical situations for **manual resuscitator** units to be used with spontaneously ventilating patients, there are few data regarding their performance in these settings. We measured the percent-delivered oxygen from 13 adult **manual resuscitator** units during simulated spontaneous ventilation in the range of respiratory frequency, tidal volume, and oxygen supply in which **manual resuscitator** units might be used with patients. We also measured the resistive pressure developed during simulated...

...all influenced percent-delivered oxygen, but the most important determinant of percent-delivered oxygen was **valve** design. **Valves** incorporating a "disc" element to prevent air entrainment from the expiratory port gave the most efficient oxygen delivery, while "duck-bill" **valves** did not reliably prevent air entrainment. Only two of the **manual resuscitator** units tested developed high resistive pressure.

Conclusion: Reliable administration of high percent-delivered oxygen to...

...ventilating patients, while retaining the capability to manually ventilate them, is best achieved by a **manual resuscitator** unit with a **valve** of low resistance, incorporating a disc to prevent air entrainment. We recommend that manufacturers indicate on the product information sheet the degree (and confidence limits) to which their **manual resuscitator** unit presents resistance and delivers oxygen to a spontaneously ventilating subject.

25/3,K/79 (Item 68 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

00815466 Genuine Article#: EZ155 No. References: 0
Title: PRELIMINARY EVALUATION OF A PROTOTYPE TUBE- VALVE **-MASK VENTILATOR FOR EMERGENCY ARTIFICIAL-VENTILATION**
Author(s): GIFFEN PR; HOPE CE
Corporate Source: VICTORIA GEN HOSP,DEPT ANAESTHESIA,1278 TOWER RD/HALIFAX B3H 2Y9/NS/CANADA/; VICTORIA GEN HOSP,DEPT ANAESTHESIA,1278 TOWER RD/HALIFAX B3H 2Y9/NS/CANADA/; DALHOUSIE UNIV,FAC MED,DEPT ANAESTHESIA/HALIFAXB3H 4J3/NS/CANADA/
Journal: ANNALS OF EMERGENCY MEDICINE, 1991, V20, N3, P262-266
Language: ENGLISH Document Type: ARTICLE (Abstract Available) (NO REFS KEYED)

Title: PRELIMINARY EVALUATION OF A PROTOTYPE TUBE- VALVE **-MASK VENTILATOR FOR EMERGENCY ARTIFICIAL-VENTILATION**
...Abstract: adequate ventilatory volumes and a high oxygen and low carbon dioxide delivery.

Design: The tube- **valve** -mask ventilator is powered by the exhaled air of the operator and uses a tube...

...is filled between breaths. Mouth-to-mouth breathing was the standard against which the tube- **valve** -mask ventilator and the other accepted **methods** of mouth-to-mask and **bag - valve** -mask were assessed.

Setting: Comparison studies were conducted during simulated two-person **CPR** using a training mannikin equipped to measure ventilation volume and delivered oxygen and carbon dioxide...

...as operators.

Interventions: The order in which the pairs of operators performed each of the **techniques** was randomized.

Measurements and main results: The ventilation volume and the percentage of oxygen and carbon dioxide delivered by each **technique** were as follows (mean +/- SD): Mouth-to mouth (760 +/- 290 mL, 17 +/- 1% O2, 3...

...CO2), mouth-to-mask (910 +/- 350 mL, 41 +/- 8% O2, 2.5 +/- 0.4% CO2), **bag - valve** -(soft) mask (550 +/- 230 mL, 94 +/- 3% O2, 0.03 +/- 0.02% CO2), **bag - valve** -(rigid) mask (560 +/- 300 mL, 96 +/- 3% O2, 0.03 +/- 0.02% CO2), and tube- **valve** -mask (860 +/- 290 mL, 91 +/- 7% O2, 0.2 +/- 0.2% CO2).

Conclusion: In the hands of relatively inexperienced operators, mouth-to-mouth, mouth-to-mask, and tube- **valve** -mask **techniques** provide adequate ventilation volumes to a mannikin. This was not the case with the **bag - valve** -mask **systems** (800 mL; P = 0.5 by t test). Of the **systems** that provide adequate ventilation volume, the tube- **valve** -mask appears superior in that higher oxygen and lower carbon dioxide concentrations can also be...

25/3,K/80 (Item 1 from file: 434)
DIALOG(R)File 434:SciSearch(R) Cited Ref Sci

08637892 Genuine Article#: M3085 No. References: 0
Title: OXYGEN ENRICHMENT OF BAG - VALVE **-MASK UNITS DURING** POSITIVE - PRESSURE VENTILATION **- A COMPARISON OF VARIOUS** TECHNIQUES
Author(s): CAMPBELL TP; STEWART RD; KAPLAN RM; DEMICHIEI RV; MORTON R
Corporate Source: UNIV PITTSBURGH,SCH MED,DIV EMERGENCY MED/PITTSBURGH//PA/15261
Journal: ANNALS OF EMERGENCY MEDICINE, 1988, V17, N3, P232-235
Language: ENGLISH Document Type: ARTICLE (NO REFS KEYED)

Title: OXYGEN ENRICHMENT OF BAG - VALVE **-MASK UNITS DURING** POSITIVE - PRESSURE VENTILATION **- A COMPARISON OF VARIOUS** TECHNIQUES

```
Set      Items   Description
S1          40   AU=(LURIE K? OR LURIE, K? OR MENK V? OR MENK, V? OR ZIELIN-
               SKI T? OR ZIELINSKI, T? OR BIONDI J? OR BIONDI, J?)
S2      232503   CPR OR (CARDIOPULMON? OR CARDIO()PULMON?)(W)(RESUSCIT? OR -
               RESPIRAT? OR VENTILAT? OR CIRCULAT?) OR MANUAL?()RESUSC? OR E-
               MERGENCY()MEDICAL?
S3       31258   PEEP OR PEP OR POSITIVE()(ASSIST? OR PRESSUR?)(2N)(BREATH?
               OR VENTILAT? OR RESPIRAT?) OR POSITIVE()END()EXPIR?()PRESSURE
               OR (MEDICAL OR EMT OR FIRE)(2N)RESCUE?
S4      157768   VACUUM? OR SUCTION? OR NEGATIVE()PRESSURE? OR EXTRACT?(3N)-
               (POSITIVE OR RESPIRAT? OR EXPIRAT? OR EXHAL?)
S5      318834   BAG OR BAGS OR SACK? ? OR SMARTBAG? OR SMART()BAG OR AMBUB-
               AG? OR AMBU OR POUCH?? OR BELLOW?
S6      525160   MANIPULAT? OR DECOMPRESS? OR COMPRESS?
S7      336003   THORAX? OR THORAC? OR CHEST??? OR LUNG? ? OR PULMON? OR IN-
               TRATHORA?
S8        1620   VENOUS(2N)(RETURN OR CIRCULAT?) OR (BLOODFLOW? OR BLOOD()F-
               LOW? OR BLOOD()CIRCULAT?)(2N)(RETURN? OR BACK)(2N)(HEART? OR -
               CARDIAC?) OR LOWER?()PRESSUR?(2N)(RIGHT()ATRIUM) OR LOWER?()P-
               RESSUR?(2N)(THORAX? OR THORAC?)()VENA()CAVA
S9      156467   VALVE??? OR VALVING
S10     106229   HYPOTENS? OR HYPOTENT? OR LOW()BLOOD()PRESSURE OR HEAD()(T-
               RAUMA? OR INJUR?) OR CARDIAC()ARREST OR HEART()ATTACK OR MYOC-
               ARD?()INFARCT? OR (HEMORRHAG? OR HAEMORRHAG?)()SHOCK? OR BLOO-
               D()LOSS??
S11    3941213   WIRELESS? OR WIRE()LESS? OR REMOTE? OR RADIO? OR TRANSPOND?
               OR TELECOMMUNICAT?
S12    1374233   METHOD? ?
S13    8305671   SYSTEM? ?
S14    1012783   TECHNIQUE? ?
S15    1611763   PROCEDURE? ?
S16    4032021   PROCESS??
S17        388   S2:S3(10N)S5
S18        384   S17 NOT S1
S19         19   S18 AND S8
S20        127   S18 AND S11
S21         75   S18 AND S9
S22         26   S21 AND S11
S23         68   S21 AND (S4 OR S6:S7 OR S10)
S24         75   S21 OR S23
S25         66   S24 AND S12:S16
S26         75   S22:S25
S27         59   RD (unique items)
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27/3,K/7 (Item 2 from file: 148)
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08929197 SUPPLIER NUMBER: 18610992 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Airway management during active compression - decompression **CPR. (includes reply) (Letter to the Editor)**
Rottenberg, Eric M.; Stiell, Ian G.; Hebert, Paul C.; Wells, George A.; Laupacis, Andreas
JAMA, The Journal of the American Medical Association, v276, n6, p448(2)
August 14, 1996
DOCUMENT TYPE: Letter to the Editor ISSN: 0098-7484 LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 958 LINE COUNT: 00080

Airway management during active compression - decompression **CPR. (includes reply) (Letter to the Editor)**

TEXT:
...the Editor.--Dr Stiell and colleagues(1) published a study comparing the effect of active **compression - decompression** (ACD) cardiopulmonary resuscitation (CPR) and standard CPR on outcomes of in-hospital and out-of-hospital victims of **cardiac arrest** . They concluded that ACD CPR did not improve survival or neurologic outcomes in any group of patients with **cardiac arrest** . However, testing ACD CPR in a **system** in which the ambulance services did not have the capability for endotracheal intubation is biased against successful application of ACD CPR. Since previous animal studies tested the **method** under conditions that included endotracheal intubation, it is a significant methodological error not to control...
... ensures a patent airway and allows air to move freely in and out of the **lungs** . The ACD CPR **technique** involves the use of a **suction** -cup device applied to the sternum to allow the rescuer to lift up and expand (**decompress**) the patient's **chest** between downward **compressions** .(1) Among other advantages, this action allows more air to be drawn into the **lungs** during **chest compression** and ventilation (ventilation allowed by the **bellows** action of multiple consecutive **chest compressions**) than does standard **CPR** ,(2) provided the airway is patent(3) As a result, air trapping in the **lungs** can be increased, which can augment the generated **intrathoracic** pressure(2) According to Halperin et al,(2) "Current evidence suggests that the **intrathoracic** pressure pump is probably responsible for most of the driving force for blood movement during standard external **chest compression** , although the cardiac **compression** pump probably contributes to some extent."
During standard CPR in humans, it is possible for...

...research is necessary to clarify whether upper-airway patency can be maintained reliably with these **techniques** during **chest compression** ventilation or spontaneous gasping, or whether such **techniques** are necessary at all." One of many reasons standard CPR is often ineffective and ACD...
...1) may be because the head tilt or jaw thrust maneuver was not maintained during **chest compression** ventilation or spontaneous gasping. A single bystander cannot simultaneously **compress** the **chest** and maintain a patent airway with the head tilt or jaw thrust maneuver and it is unclear whether or not airway patency was adequately maintained during **chest compression** ventilation in the study of Sriell et al. Therefore, because there is no experimental evidence...

...Columbus

1. Stiell IG, Hebert PC, Wells GA, et al. The Ontario trial of active **compression - decompression** cardiopulmonary resuscitation for in-hospital and prehospital **cardiac arrest** . JAMA. 1996;275:1417-1423.

2. Halperin HR, Chandra NC, Levin HR, et al. Newer **methods** of improving blood flow during CPR. Ann Emerg Med. 1996;27:553-562.

3. Tucker K J, Khan JH, Savitt MA. Active **compression - decompression** resuscitation: effects on **pulmonary** ventilation. Resuscitation. 1993;26:125-131.

4. Idris AH. Reassessing the need for ventilation during...

...the standard CPR group, had exactly the same airway and ventilation management. This consisted of **CPR** by 2 professional rescuers who used standard oropharyngeal airways and **bag - valve** -mask ventilation prior to arrival at the hospital. All out-of-hospital rescuers were also...

...Rottenberg may have overlooked the fact that in many US and most Canadian jurisdictions, prehospital **cardiac arrest** patients are not intubated until they arrive at the hospital. Consequently, the out-of-hospital...

...wanted to determine if ACD CPR improved survival in out-of-hospital emergency medical services **systems** that do not provide advanced cardiac life support measures. Unfortunately, we were unable to demonstrate...

...Investigators
Ottawa, Ontario

1. Lurie KG, Shultz JJ, Callaham ML, et al. Evaluation of active **compression - decompression** CPR in victims of out-of-hospital **cardiac arrest** . JAMA. 1994;271: 1405-1411.

2. Schwab TM, Callaham ML, Madsen CD, Utecht TA. A randomized clinical trial of active **compression - decompression** CPR vs standard CPR in out-of-hospital **cardiac arrest** in two cities, JAMA. 1995;273:1261-1268.

...DESCRIPTORS: **Cardiac arrest** --

27/3,K/21 (Item 16 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
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02331113 SUPPLIER NUMBER: 03667860 (USE FORMAT 7 OR 9 FOR FULL TEXT)
What to do after CPR; how to help the patient get the air he needs.
Jones, Sande
RN, v48, p28(6)
March, 1985
ISSN: 0033-7021 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT
WORD COUNT: 2694 LINE COUNT: 00202

... he needs

All the sophisticated equipment in the world won't save a patient in **cardiac arrest** unless you can maintain an open airway. While clearing the airway initially may not be...

...and endotracheal tubes.

When and how to use oral and nasal airways

Unconscious patients in **cardiac arrest** often need an oropharyngeal, or oral, airway adjunct to prevent the tongue from falling back...

...near the back of the tongue, rotate it back to its proper position. An alternative **method** is to move the tongue out of the way with a tongue depressor, then insert the airway by holding it in its normal position. Practice these **techniques** on a mannequin until you can use them confidently.

Once the airway's in place...

...skin ulceration.

How to ventilate the patient correctly

After an airway has been inserted, a **manual resuscitator** --also known as a **bag - valve** -mask device or **Ambu bag** --is used to deliver **positive pressure breaths** . The equipment you'll need for this **procedure**0 includes a self-inflating bag with mask, an oxygen connecting tube, an oxygen reservoir, and...

...spread your thumb and index finger on the mask, one on either side of the **valve** connection. Use a squeezing motion of your hand to seal the rim of the mask to the patient's face.

With your other hand, **compress** the bag. Watch the patient's **chest** to make sure it rises and falls with each squeeze. You should feel resistance during...

...you should hear air escape during exhalation. If the resistance increases as you continue to **compress** the bag, assess the patient for obstruction of the airway or a change in **lung** compliance. You may need to re-establish correct head position or readjust the mask for...

...placed upside down. You should practice on a mannequin until you feel comfortable with this **procedure** .

Each time you squeeze all the air out of the bag, you deliver 500 to 700 cc of air into your patient's **lungs** . Since **cardiac arrest** patients usually need a higher oxygen concentration than the 21% in room air, have someone attach oxygen tubing from the flow meter of the oxygen outlet to the inlet **valve** of the bag and turn on the flow meter while you continue ventilating with room...use a bag with a reservoir, what flow rate you use, and how fast you **compress** the **bag** . Most **manual resuscitators** with an attached reservoir deliver an inspired oxygen

concentration of 75% to 90% at a...

...and aspirate gastric contents. If gastric distention occurs, you should insert a nasogastric tube to **decompress** the stomach. It's also a good idea to use a transparent resuscitator mask so...

...patent airway but still have problems ventilating the patient--as evidenced by increased resistance, poor **chest** movement, and rapidly increasing gastric distention. In that event, the patient probably needs to be...

...the airway with your mouth or a manual resuscitator and watch for the patient's **chest** to rise. Have someone check for bilateral breath sounds as you do this. If the **chest** rises and breath sounds are present, the device is properly positioned. You can then inflate the cuff by injecting 30 cc of air with a Luer-Lok syringe through the **valve** located at the top of the tube. Recheck placement after the cuff has been inflated...

...a small hole at the distal end of the tube and a one-way, nonrefluxing **valve** at the upper end to prevent air from entering the stomach. The opening in the...

...end allows a nasogastric tube to be inserted through the esophageal tube and connected to **suction** to **decompress** the stomach.

The most common complication associated with EOA and EGTA tubes is accidental endotracheal...

...patient usually vomits when either tube is removed and esophageal occlusion is relieved, so keep **suction** equipment connected at the bedside. Before an EOA or EGTA is removed, the patient should...
...at both ends. Thus it acts as a vent for the stomach and permits gastric **suctioning** .

Unlike the EOA and EGTA, the tracheoesophageal airway can stay in the trachea if it...

...in the esophagus.

When the patient needs an endotracheal tube

Endotracheal intubation is the preferred **technique** for airway management because it provides more direct control over the airway than other **methods** . An ET tube is usually inserted when the patient requires long-term mechanical ventilation. The...inflated with 5 to 10 cc of air. This feature guards against aspiration and allows **suctioning** and intermittent positive pressure ventilation with 100% oxygen.

Unless you have the special training required...

...Many physicians place a malleable stylet in the tube to stiffen it during insertion. A **suction** set-up should be at the bedside.

* For a detailed description all illustrations of the insertion **procedure** , see Garrity, E.M. Emergency! When intubation is up to you. RN 46:49, October...

...water-soluble lubricant to the end of the ET tube.

You may be asked to **suction** the patient before intubation so that the physician can get a clearer view of the...

...To perform this maneuver, apply firm, backward pressure over the cricoid cartilage until the insertion **procedure** is completed and the cuff inflated.

You may also be asked to confirm bilateral breath...

...bagged into the tube. If you hear breath sounds on only one side of the **chest** , it may mean that the tube has passed into a mainstem bronchus and must be...

...the tube has entered the esophagus instead of the trachea and must be removed. A **chest** X-ray should always be done post-intubation to verify placement.

To secure the ET...

...hold the tube in place without adhesive tape.

Maintaining a patient's airway during a **cardiac arrest** is a demanding task that requires not only knowledge of, but also practice in, using...

...DESCRIPTORS: **Technique** ;

27/3,K/52 **(Item 1 from file: 129)**
DIALOG(R)File 129:PHIND(Archival)

00759800
Alert over US single-use resuscitator entering UK
Clinica 1012 p5, June 21, 2002 (20020621)
STORY TYPE: F WORD COUNT: 154

...for the US market have been mistakenly distributed to UK customers with a pressure-limiting **valve** override feature that is not described in the user instructions. A device alert issued this week by the Medical Devices Agency (MDA) warns that a number of **Ambu** Spur infant/child single-use **manual resuscitators** , made by **Ambu** of the US, pose a risk of overpressure.

Both the UK and US versions of the device have a 40cm H2O pressure-limiting **valve** . The US version, however, has an additional override clip covering the **valve** , preventing this from opening. Pre-use testing of the resuscitator cannot be performed as specified...

27/3,K/54 (Item 3 from file: 129)
DIALOG(R)File 129:PHIND(Archival)

00071970
Comparing ventilation methods
Clinica 230 p19, January 09, 1987 (19870109)
WORD COUNT: 219

Comparing ventilation methods

...to-mask ventilation is called for by researchers who performed a study to compare six **methods** of emergency ventilation, and report their findings in a letter to The Lancet (November 29th, p 1274). Medical students were asked to use six **methods** of ventilation on a manikin modified to include a Wright spirometer in the trachea. The methods studied were mouth-to-mouth, bag- **valve** -mask with one operator, mouth-to-mask, bag- **valve** -mask with two operators, Brook Airway, and mouth to **Ambu** mask.

In **cardiopulmonary resuscitation** , say the researchers, the delivery of an adequate tidal volume is vital, and the American...

...ml. The students were unable to deliver adequate volumes via the Brook airway or bag- **valve** -mask with one operator. Adequate ventilation was achieved with the bag- **valve** - mask and two operators, while use of the remaining **methods** resulted in inflation of more than three times the recommended minimum.

The researchers do point...

...delivery of excessive tidal volumes carries the risk of gastric distension and regurgitation and diminished **lung** volume (by elevation of the diaphragm)"....

27/3,K/56 **(Item 1 from file: 135)**
DIALOG(R)File 135:NewsRx Weekly Reports

0000044914 (USE FORMAT 7 OR 9 FOR FULLTEXT)
Technique **and** Valve **Improve CPR**
Heart Disease Weekly, March 22, 2000, p.9-10

DOCUMENT TYPE: Expanded Reporting LANGUAGE: English
RECORD TYPE: FULLTEXT
WORD COUNT: 592

Technique **and** Valve **Improve CPR**

TEXT: A cardiopulmonary resuscitation (CPR) **technique** using devices developed at the University of Minnesota Medical School has been shown in a clinical trial to maintain near-normal blood pressure in **heart attack** victims.

The study was published in the March 7, 2000, issue of the American Heart...

The **method** improves upon active **compression - decompression** (ACD) CPR, which is performed with a hand-held plunger-like device called the CardioPump. With this **technique** , blood is pushed out of the **chest** to the brain and other organs during **compression** , just as in standard CPR. Unlike standard CPR, the pump actively pulls the **chest** back to its original position during **decompression** . It improves the flow of oxygenated blood to the heart, increases the volume of blood pumped with each **compression** , and allows more air to flow into the **lungs** .

A previous study by a group that included the authors of the Circulation article showed that ACD CPR significantly improved long-term survival rates among patients who had **cardiac arrest** outside the hospital. That study was published in the August 19, 1999, New England Journal of Medicine .

The latest study introduced a **valve** to ACD **CPR** . During **CPR** the **chest** works like a **bellows** , and the **valve** improves the function of the bellows. The **valve** has a silicone diaphragm that decreases pressure in the **chest** during **decompression** . This results in a greater **vacuum** effect, which pulls more blood back into the heart and thus improves overall CPR efficacy.

The study involved 21 patients, 10 who had ACD CPR without the **valve** , 11 with it. More patients returned to spontaneous circulation with (n=4) than without (n=2) the **valve** ; those with the **valve** also returned faster (average 19.8 minutes with vs. 26.5 minutes without). With the combination of the **valve** and the pump, patients in **cardiac arrest** had near-normal blood pressures for up to 30 minutes or until they were resuscitated...

...the division of cardiology at the university and co-developer of the pump and the **valve** . "This is the first time we have used this combination of devices in patients. With...

...give their consent.

More than 400,000 patients die every year from out-of-hospital **cardiac arrest** in the United States, where it remains the number one cause of death.

"Fewer than five percent of patients with out-of-hospital **cardiac arrest** in the United States ever survive to hospital discharge, due in part to the inherent...

...and brain get less than 30% of normal blood flow. With ACD CPR plus the **valve** , those organs get more than 60% of normal flow. The group will

conduct further studies...